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TACTICS

BY

BALCK
Colonel, German Army

VOLUME I.

INTRODUCTION AND FORMAL TACTICS OF INFANTRY.

TRANSLATED BY

WALTER KRUEGER,
First Lieutenant 23rd Infantry, U. S. Army
Instructor Army Service Schools.

—: THIRD THOUSAND :—

Fourth completely revised edition.
With numerous plates in the text.

U. S. CAVALRY ASSOCIATION,
FORT LEAVENWORTH, KANSAS.
1915

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TRANSLATOR'S PREFACE.

The translation of this book was undertaken at the instance of Major John F. Morrison, General Staff, who desired to make use of it in the course in tactics in the Army Service Schools.

It is an epitome of the interpretation and application of tactical principles in the various armies, discussed in the light of the tactical views and methods prevailing in Germany, and amplified by numerous examples from military history.

The professional value of this book to all officers of our Regular Army and Militia who are endeavoring to gain a working knowledge of tactics, is so obvious that any comment would be superfluous.

Army Service Schools,
Ft. Leavenworth, Kansas,
December, 1910.

PREFACE.

The first volume of "Tactics," which appeared in its first edition in 1896, and for which the preparatory work reached back more than a decade, now appears in its fourth edition in a completely changed form. The lessons gained in war and improvements in weapons have corrected many earlier views. While the Boer war confused the views on infantry combat and brought forth more lessons in a negative than in a positive form, the Russo-Japanese war has had a great educating influence, in that it corroborated the soundness of the lessons gained in the Franco-German war, but also in that it amplified those lessons commensurate with the improvements in weapons. The fundamental principles upon which success depends have remained the same.

For a long time I hesitated to comply with my publisher's wishes for a new edition. It would not have been difficult to publish long ago a new edition, based upon the many lessons of war communicated to me by members of foreign armies soon after the Russo-Japanese war. But, after an extended period of theoretical work, I was more inclined to avail myself once more of the opportunity of gaining practical experience by service with troops. Pure theoretical reflection is only too apt to depart from the requirements of practice and to overlook the friction appearing everywhere. The battalion commander, more than any one else, is called upon to act as the tactical instructor of his officers and knows best where the shoe pinches. Moreover, the proximity of the maneuver ground to my present station gave me an opportunity of observing the

field training of a large number of battalions and regiments of infantry and artillery, and to compare notes with brother officers of the other arms. In addition, several trips abroad and, incidental thereto, visits to battlefields, furnished valuable suggestions. I postponed issuing the new edition until the publication of the new Russian and Japanese Drill Regulations, which, with our own excellent regulations, best illustrate the lessons learned from the war in the Far East. For this fourth edition I was further able to draw upon the new French (1904), Italian (1905), Belgian (1906), U. S. (1904), British (1905), and Swiss (1908) Drill Regulations. This enumeration alone justifies the statement, "completely revised," appearing on the title page.

I have earnestly endeavored to make use of foreign experiences in detail. The words of Lieutenant-General Sir Ian Hamilton of the British Army, to whose writings I owe a great deal, deserve special attention in studying the drill regulations of foreign armies: "It is a blessing that the greater and prouder an army, the more immovably it is steeped in conservatism, so that as a whole it is finally incapable of assimilating the lessons gained by other armies. Military attachés may discover the most important points in the training and employment of foreign armies and urgently recommend their imitation, but their comrades will pay no more attention to them than did Napoleon III. to Stoffel's reports on the Prussian army before the outbreak of the Franco-German war."

The treatment of the subject matter has remained the same throughout; it represents, as in the first edition, the principle that tactical lessons must be deduced from human nature, from the effect of weapons, and from experience in war, proper regard being had for national characteristics and historical transmission. *Tactics is psychology.* My statements in regard to fire effect are based, as before, upon the works of His Excellency, Lieutenant-General

Rohne. The publications of Historical Section I of the Great General Staff and the splendid works of the late Major Kunz, furnish the basis for examples cited from military history. An almost too copious literature is already available on the Russo-Japanese war. The monographs (*Einzelschriften*) of the Great General Staff, and of Streffleur, especially "*Urteile und Beobachtungen von Mitkämpfern*," published by the latter, afford a rich field for research.

It is not difficult to cite examples from military history in support of any tactical procedure, but such examples require a very careful sifting before they can be recommended as worthy models for our action in front of the enemy.

The Austrians deduced the necessity of the most brutal shock action from the experience gained by them in their combats in Upper Italy in 1859, and the British were not very far removed from completely denying the feasibility of making an attack soon after the Boer war; but the desire to avoid losses was forced into the background by the necessity of annihilating the enemy. In the Far East the Russians finally had to learn again the same bitter lessons as at Plevna.

Simultaneously with this fourth edition, there appears in Athens a translation in Modern Greek from the pen of Captain Strategos of the Greek General Staff, well known to many German officers from his War Academy days.

It is hoped that the fourth edition may receive the same kind reception at home and abroad that was given its three predecessors. For all communications, suggestions or corrections, directed either to me or to my publisher, I will be sincerely grateful.

THE AUTHOR.

POSEN, March, 1908.

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ABBREVIATIONS USED IN THIS TRANSLATION.

C. D. R. =Cavalry Drill Regulations.

F. A. D. R.=Field Artillery Drill Regulations.

F. A. F. R.=Field Artillery Firing Regulations.

F. S. R. =Field Service Regulations.

Gen. St. W. (*Generalstabswerk*)=German General Staff account of the Franco-German War (unless otherwise indicated).

I. D. R. =Infantry Drill Regulations.

I. F. R. =Infantry Firing Regulations.

g. = gram = 15,432 troy grains.

kg. = kilogram = 1000 g. = 2.2 lbs.

kgm. = a unit of work accomplished in raising a kilogram through a meter against the force of gravity.

m. = meter = 39.37 in.

km. = kilometer = 1000 m. or ⅝ mile.

x = pace.

INTRODUCTION.

INTRODUCTION.

1. WAR.

CLAUSEWITZ, in his work *On War,* defines war as "a continuation of state policy by other means; an act of violence committed to force the opponent to comply with our will." The civil code is incapable of furnishing full satisfaction to individuals in cases of outraged honor, and is obliged, under certain circumstances, to allow the injured party to obtain such satisfaction by immediate chastisement of the offender or by challenging him to a duel. In like manner there is no law which could afford nations complete satisfaction for affronts to their honor; and it is obvious that it would be as impossible to abolish war in the world, in the family of nations, as it would be to abolish dueling among the subjects of a state. The total abolition of dueling would produce the same results on the life of the individual that the cessation of wars would produce on the development of the national life of every state and on the intercourse of nations with one another. "Eternal peace," wrote Moltke on December 11th, 1880, to Professor Bluntschli, "is a dream, and not even a beautiful one; for war is a part of God's system in ruling the universe. In war, man develops the highest virtues; courage and unselfishness, devotion to duty and self-sacrifice even to death. Without war the world would stagnate in materialism." Treitschke ventured a similar opinion in 1869.* "Every nation, especially a refined and cultured one, is apt to lapse into effeminacy and selfishness during a protracted period of peace. The unlimited comfort enjoyed by

**Das konstitutionelle Königtum in Deutschland,* in *Historische und politische Aufsätze,* New edition, II.

society causes not only the downfall of the state but destroys at the same time all those ideals which make life worth living. Narrow provincialism or selfish and worldly activity, looking only toward the gratification of all desires of the individual, undermines the foundations of a higher moral philosophy and the belief in ideals. Fools arrive at the vain conclusion that the life object of the individual is acquisition and enjoyment; that the purpose of the state is simply to facilitate the business affairs of its citizens; that man is appointed by an all-wise providence to buy cheaply and to sell at a profit; they conclude that war, which interferes with man's activities, is the greatest evil, and that modern armies are only a sorry remnant of mediaeval barbarism. * * * It proves a positive blessing to such a generation if fate commits it to a great and righteous war, and the more it has become attached to the comfortable habits of mere social existence, the more violent the reaction which rouses it to warlike deeds in the service of the state. * * *" "The moment the state calls, 'My life, my existence is at stake,' there is aroused in a free people that highest of all virtues, the courage of self-sacrifice, which can never exist in time of peace nor be developed to such an extent by peaceful pursuits. Millions are united in the one thought—the fatherland; they are animated by that common sentiment of devotion unto death—patriotism—which, once experienced, is never again forgotten, and which ennobles and hallows the life of a whole generation. * * *" The greatness of war lies in those very phases which an effeminate civilization deems impious. "A great nation must be powerful," exclaimed Scherr, in 1870.* "That is not only its duty, but its nature. If opposition is encountered, a nation is not only permitted to force a way for its righteous cause and resort to war, but it is its duty to do so. War always has been, and, so long as men and nations exist on the earth, it always will be, the *ultima ratio.*"

*Das grosse Jahr, in Hammerschläge und Historien.

Since war is the *ultima ratio* of state policy, and as a sovereign state must insist on absolute independence in determining its affairs and its course of action, it follows that the verdict of a court of arbitration, on the larger and more serious questions, can have a decisive influence on the action of the contending parties only if the arbitrator possesses the power to enforce his decision, and is embued with a determination to use that power. Thus the Pope was able to arbitrate the question of right between Germany and Spain as to the possession of the Caroline Islands, but a like verdict could never decide the question of might between Germany and France as to the possession of Alsace-Lorraine.*

The utopian plans for a universal international court of arbitration are chimerical and conjured up by idealists unacquainted with the harsh facts of reality, if their ideas are not, indeed—as are many proposals for disarmament—calculated to serve as a cloak for ambitious plans.

If diplomatic means do not suffice to adjust a dispute, then the question of right between two states at once becomes a question of might. But the existence of a spirit of fair play is taken into account nevertheless, for each party to the controversy will seek to have the justice of its cause recognized. The moral support engendered by fighting for a just cause is so great that no state is willing to dispense with it.† This circumstance, coupled with the growing power of public opinion and with the influence of representative government, has contributed to reduce the number of wars. Wars between cabinets, like those in the days of Louis XIV., are no longer

*The constitution of the old German Confederation provided for a settlement of disputes arising among its members; this verdict was to be enforced by summary proceedings when necessary. The war of 1866 proved that the paragraphs of the constitution mentioned, of necessity had to fail the moment the vital interests of two powerful states came into conflict. See VON LETTOW-VORBECK, *Geschichte des Krieges von 1866*, I, p. 115.

†"If princes wish war they proceed to make war and then send for an industrious jurist who demonstrates that it is therefore right." FREDERICK II.

"Every war is just which is necessary and every battle holy in which lies our last hope." MACHIAVELLI, *Il Principe*.

possible. As a result of the universal liability to service, the whole nation takes part in a war; every class of society suffers and has its pursuits interfered with; everything presses to an early decision, to a prompt crushing of the opponent.

This is attained by defeating the enemy's forces, by occupying the hostile country and seizing the enemy's sources of supply, so that he will be convinced of the futility of further resistance. (Campaigns of 1859, 1866, and 1870-71). Only in the rarest cases will it be necessary to continue the war until the power of resistance of the hostile state is completely destroyed. (American Civil War). The extent to which the enemy's power of resistance may have to be crippled or broken, in order to compel peace, depends upon his tenacity. Political considerations will also have to be taken into account in answering this question. From the military point of view, however, the purpose of every war will always be the complete overthrow of the enemy.

2. STRATEGY AND TACTICS.

Precise definitions of strategy and tactics, clearly fixing the scope of each, have been vainly sought in the past. That efforts in this direction have led to no results is only natural, as tactics and strategy are complementary subjects that often encroach upon each other, while grand tactics is frequently identical with strategy.

Von Bülow, the author of *The Spirit of Modern Warfare* (1798)*, calls those movements strategical which are made outside the enemy's sphere of information. Von Willisen considers strategy the science of communications, tactics the science of fighting. Von Clausewitz calls strategy the science of the use of battles for the purpose of the war

*Geist des neueren Kriegssystems.

(Jomini: *"l'art de diriger les armées sur les théatres d'opérations"*),* tactics the science of the use of military forces in battle (Jomini: *"l'art de diriger les troupes sur les champs de bataille"*).†‡ General von Horsetzki (1892) defines strategy as the study of the conditions necessary for success in war. Archduke Charles calls strategy the "science of war" and tactics the "art of war". Frederick the Great and Napoleon always employed the term *"l'art de guerre"* instead of the term "*Strategy*". None of these definitions is comprehensive enough, because they do not cover marches, outposts, the supply service, and enterprises in minor tactics. Professor Delbrück's definition is much more appropriate: "Strategy is the science of utilizing military resources for the attainment of the object of the war, tactics the art of leading troops into and in battle." Thiers, the French historian, instead of seeking to define strategy and tactics, contents himself with explaining the problems of each: *"Le stratège doit concevoir le plan de campagne, embrasser d'un seul coup d'oeil tout le théatre présumé de la guerre, tracer lignes d'opérations et diriger les masses sur les points decisifs. Le tacticien a pour mission de régler l'ordre de leurs marches, de les disposer en bataille aux différents points, indiqués par le stratège, d'engager l'action, de la soutenir et de manoeuvrer pour atteindre le but proposé."*¶ Fieldmarshal Moltke calls strategy "the

*"The art of directing armies in the theater of operations."

†"The art of directing troops on the field of battle."

‡ "Everything affecting the use of troops in battle and the regulation of their activity with reference to battle, has been included in the term 'tactics', while the term strategy is synonymous with 'generalship,' exclusive of such matters as fall into the domain of tactics." BLUME, *Strategie*, p. 33.

"Tactics teaches *how*, and strategy *why*, one should fight." General v. SCHERFF.

Strategy determines direction and objective of the movement of armies, while the manner of execution belongs to tactics.

¶"Strategy should devise the plan of campaign, take in with a comprehensive glance the entire probable theater of war, establish the lines of operations and direct the masses on the decisive points.

"It is the mission of the tactician to decide upon the order of march of the troops, to form them for battle at the various points determined by strategy, to begin the action, to sustain it, and to maneuver so as to attain the desired end." THIERS.

application of common sense to the conduct of war."* For practical purposes it is sufficient to define strategy as the *science of the conduct of war,* tactics as the *science of troop-leading.* Strategy brings about the decision on the theater of war, while the duty of carrying it out, in the manner desired by the commander-in-chief, devolves upon tactics. Thus the strategical idea culminates on the battlefield. The concentric advance of the Prussian armies into Bohemia in 1866 naturally led to a complete envelopment of the Austrians on the field of Königgrätz. The German attack in the battle on the Hallue, Dec. 23rd, 1870, was based on the strategical requirement of driving the French from their line of retreat leading to Arras and Bapaume, by enveloping their right flank. The attempts made by the 15th Infantry Division, which was holding the enemy in front, to envelop the left wing of the French, interfered with the execution of the correct strategical plan. Thus, in following up a success, in itself quite unimportant (the capture of Bussy), the leading basic principle was forgotten. The same thing happened here that Moltke censured in his official report on the war of 1866, wherein he stated: "The higher commanders have not been able to make their influence felt down to the subordinate grades. Frequently, as soon as the divisions and brigades have come in contact with the enemy, all control over them has entirely ceased."

Archduke Charles considered the subordination of tactics to strategy a law. "Tactics should execute the conceptions of strategy; where the two come in conflict, where strategical considerations are opposed to tactical interests, the strategical considerations should, as a rule, take precedence. Tactics must occupy a subordinate place and attempt to neutralize existing disadvantages by skillful dispositions." Clausewitz not unjustly censures Archduke Charles for placing advantages of terrain in the first rank, and for failing to attach the proper importance to the annihilation of the hostile forces.

*v. MOLTKE, *Tactical Problems, No. 58* (1878) p. 133.

Should the demands of strategy conflict with those of tactics on the battlefield, the latter must unquestionably take precedence, since the general's foremost thought must be the annihilation of the hostile forces. Tactical considerations should likewise govern in the selection of the direction of attack in a battle, strategical reasons for striking in this or that direction becoming effective only after the attainment of tactical success. It is true that strategy, by directing the armies and their concentration on the battlefield, provides tactics with the tools for fighting and assures the probability of victory; but, on the other hand, the commander-in-chief appropriates the fruits of each victory and makes them the basis for further plans. "The demands of strategy are silent in the presence of tactical victory; they adapt themselves to the newly created situation." Fieldmarshal MOLTKE.*

3. THE METHOD OF INSTRUCTION.

While Archduke Charles considers mathematical axioms the basis of the higher art of war, military history is for us the principal source from which to gather knowledge.†

In military history we have a guide by which, if we lack personal experience in war, we can test the results of our reflections and of our experience on the drillground. Military history moreover enables us to appreciate those con-

* The view that the direction of attack should be governed by the possibility of easy execution in minor warfare only, is held by General v. Scherff, who says: "General v. Moltke was not influenced by the question 'will the attack here or there be tactically easier or more difficult?' Only the question, 'will it there be strategically advantageous or not' was able to determine his course with reference to measures on the battlefield."

†See lecture by Prince HOHENLOHE: *Kriegserfahrung und Kriegsgeschichte*, Neisse, 1879.

"Let my son often read and meditate upon history; it is the only true philosophy. Let him often read and meditate upon the wars of the great captains; it is the only means of learning the art of war." NAPOLEON I., on April 17th, 1821.

"Past events are useful to feed the imagination and furnish the memory, provided their study is the repetition of ideas that judgment should pass upon." FREDERICK THE GREAT.

trolling factors which, in map problems, do not appear at all, and which, in exercises on the terrain, appear only in a restricted measure. One must learn the conduct of war from the experience of others; one's own experience is costly and is almost invariably gained too late. That experience in war, of itself, is not sufficient (aside from the fact that it is gained too late in a given case) is illustrated by the defeat of the Austrians in 1866, of the French in 1870-71, and of the British in South Africa. *"Les Autrichiens,"* says Colonel Foch,* *"ont fait la guerre sans le comprendre, les Prussiens l'ont compris sans le faire, mais ils l'ont étudiée."* "Military history is neither a compilation of clever theories nor a book designed for whiling away idle moments. It is, on the contrary, a careful teacher, who, if we are attentive, allows us to view and grasp matters which we have never before been in a position to see, but which, nevertheless, are liable to confront us in the same, a similar, or a changed form, and demand unpremeditated, instant and decisive action, entailing heavy responsibilities. Military history, it is true, offers us, in the first instance, only events and their outline, conditions and phenomena, but it also presents, what the cleverest theory is unable to furnish, a graphic illustration of the disturbing elements in war, an illustration of the influences, doubts, embarrassments, unforeseen accidents, surprises and delays. It describes the course pursued by commanders and by practical military common sense in surmounting these difficulties. It prepares in advance the mental balance necessary at the moment of action; it should prepare also for the unexpected. It affords a substitute for lack of military experience, for the accumulation of which the life of the individual, prior to the moment of action, has been too short."† The pedantic enumeration of a few examples in support of a stated opinion can-

* *Principes de la Guerre*, 1903.

"The Austrians," says Colonel Foch, "made war without understanding it; the Germans understood war without making it; but they studied it."

† From *Meinungen und Mahnungen*, Vienna, 1894.

not suffice. It should not be difficult to find examples from military history in support of any opinion; frequently even an incorrect tactical contention can be vindicated by such examples. For in war the action taken is as often wrong as correct; the scales are turned by factors which in most cases appear indistinctly or not at all. The experiences of military history must, therefore, only be used with caution if tactical lessons are to be drawn from them. "A mere allusion to historical events," says Clausewitz in his chapter on examples, "has the further disadvantage that some readers are either not sufficiently acquainted with these events, or remember them too imperfectly to enter into the author's ideas, so that such students are compelled to accept his statements blindly or to remain unconvinced. It is, of course, very difficult to describe historical events as they ought to be described if they are to be used as proofs, for authors usually lack the means, as well as the time and space, necessary for such descriptions. We maintain, however, that in establishing a new or a doubtful view, a single event, thoroughly described, is more instructive than a mere allusion to ten. The principal evil resulting from a superficial reference to historical events does not lie in the fact that the author cites them incorrectly in support of his theory, but in the fact that he has never become thoroughly acquainted with those events. In consequence of such a superficial, haphazard treatment of history, a hundred erroneous views and theoretical projects are created, which would never have appeared if the author had been compelled to deduce, from a careful analysis of the connected facts in the case, what he publishes and wishes to support by historical proofs. If we have convinced ourselves of the above outlined difficulties attending the employment of historical examples, and appreciate the necessity for thoroughness in their treatment, we will come to the conclusion that the more recent military history is the most natural source from which to select examples, inasmuch as recent history

alone is sufficiently known and analyzed."* The events from military history mentioned in this work are cited simply as proofs of certain phenomena; the proper analysis of these proofs must be left to the student.

The applicatory method† is used frequently by preference as the system of instruction, but its creator, General von Verdy du Vernois, considers it merely a complement of the deductive method, on which it is predicated and based. "The weakness of the whole applicatory system of instruction lies in the fact that a textbook based upon it, although written by a master hand, can portray only isolated examples, and that these, studied again and again, soon lose their value in the same manner as a maneuver terrain that has become too well known. For, although we ordinarily find principles represented in a connected form, this method of instruction can only convey them in a fragmentary manner in connection with the details of the events described."‡ The success of the applicatory method depends largely upon the individuality of the instructor, and owes its charm to the personal intercourse between teacher and pupil. Only an expert, who possesses a thorough professional knowledge, who is master of his subject, and who has the faculty of presenting it skillfully, will be able to produce imaginary scenes which faithfully represent reality and are free from objectionable features. By constant practice with specific cases, under the most diverse situations, the nature of war may in this way be taught and initiative developed as well as facility acquired in issuing appropriate, clear, and concise orders. One danger of using nothing but the applicatory method must be noted. The instructor, as representative of a definite theory, finds it comparatively easy to select the conditions governing a specific case in such a way that the theory which he represents neces-

* *On War*, II, Chapter 6, p. 111.
See also CLAUSEWITZ' remarks on *"Criticism,"* II, Chapter 5.

† See KÜHNE, *Kritische Wanderungen*, 4 and 5, Preface p. 5.

‡ VON BOGUSLAWSKI, *Entwickelung der Taktik*, II, p. 17.

sarily appears to be the correct one. This is especially true when the director of an applicatory problem determines the action of the opposing side. The two methods (the applicatory, or inductive, and the deductive) must be so supplemented that the lesson in tactics clearly illustrates the purpose and object of a tactical operation and allows of the attainment of a thorough knowledge of the means necessary to gain that object* "He who is able to understand the situation, has a definite purpose in view, and knows the means with which to carry out that purpose, will, by a simple mental operation, arrive in each particular case at an appropriate decision, and will be able, furthermore, to carry out that decision, provided he does not lose his head. If a clear comprehension of the purpose in view and of the means for carrying out that purpose lie within the sphere of theory, the estimate of the situation and the decision are governed by the circumstances of the particular case. Should the training in this direction lie outside the sphere of theory, it will logically belong to the domain of the applicatory method of instruction. The two methods must, therefore, supplement each other.

"If the decision is to culminate in action, strength of character is required, providing the determination to execute, in spite of unavoidable difficulties, what has been recognized as proper, and also the professional ability necessary to carry out the determination to its logical conclusion. All that theory can do toward forming this character is to emphasize its importance and to refer students to military history. The applicatory method, however, can develop strength of character by compelling the student to form decisions under pressure of a specified time limit (in solving problems) or by subjecting him to the influences of certain situations such as would

*"When one attempts to establish a principle, immediately a great number of officers, imagining that they are solving the question, at once cry out: 'Everything depends on circumstances; according to the wind must the sails be set.' But if you do not know beforehand which sail is proper for such and such a wind, how can you set the sail according to the wind?" BUGEAUD, *Aperçus sur quelques détails de guerre.*

be encountered in war (maneuvers). The means available in tactical instruction in time of peace, for the development of strength of character, are, however, very limited when compared with the great demands made by the abnormal conditions of war, so out of all proportion to those of peace. This should be thoroughly understood, lest we overestimate the value of these means as well as the results to be obtained from them in times of peace.

"After theory has fulfilled its mission of clearly indicating the purpose and object of an operation, as well as the means by which it may be attained, and applicatory practice has performed its office of developing initiative and professional skill, a third factor is still necessary—the study of military history. From this foundation of knowledge both 'theory' and 'applicatory method' must draw their material; to this source they must again and again refer in order to guard against erroneous ideas of their own creation, which are often as different from reality as day is from night."*

Viewed as the science of the leading and employment of troops, tactics may be divided into two parts:

1. **Formal tactics,** or that contained in drill regulations. This portion of tactics furnishes the formations used by troops when assembled, on the march, and in action, and contains the regulations governing the conduct in battle of troops acting alone without regard to the coöperation of the other arms, and without reference to the terrain.

2. **Applied tactics**† deals with the combined action of the several arms on the march, in camp, and in action, taking into account influences of the terrain, seasons, and the time of day in field warfare. Fortress warfare should, strictly

*F. C. v. H. (*Fieldmarshal Lieutenant General* CONRAD v. HÖTZENDORF, Chief of Staff of the Austro-Hungarian Army). *Zum Studium der Taktik*, p. 2.

† v. BOGUSLAWSKI, *Entwickelung der Taktik*, II, Chapter 23. "The higher, Grand Tactics, is the initiation and conduct of battles—subordinate, or minor tactics, is the manner of fighting, or the battle-tactics of an arm considered in its details."

speaking, be included under this heading; that is to say, the employment of tactical principles* pertaining to the mobile arms, in conjunction with foot-artillery and technical troops on a prepared battlefield. The principles are the same in field and fortress warfare; the only difference between them lies in the employment of the means necessitated by the preparation of a field of battle in time of peace. Military history shows that a clear distinction between field and fortress warfare is impossible. (Sebastopol, Düppel, Plevna, and Port Arthur).

4. DRILL REGULATIONS.

Drill regulations are the accumulation of the tactical views and lessons of a certain period. They illustrate the tactical condition which becomes perceptible at the moment of a certain development of the fighting tools as represented by man and weapons. Man, in his peculiarities, in his weaknesses, is the constant. He constitutes the psychological element, inseparable from the science of combat, and as such is the definitely given magnitude; the effect of weapons, however, appears always as the variable factor. New weapons, therefore, necessitate new tactics.

It will be observed also "that changes of tactics have not only taken place *after* changes in weapons, which necessarily is the case, but that the interval between such changes has been unduly long. This doubtless arises from the fact that an improvement of weapons is due to the energy of one or two men, while changes in tactics have to overcome the inertia of a conservative class; but it is a great evil. It can be remedied only by a candid recognition of each change."† The history of the tactics of the 19th Century furnishes

*MAJOR GUNDELACH, *Exerzierreglement und Festungskrieg*, Berlin, 1908.

†MAHAN, *The Influence of Sea Power upon History*, pp. 9 and 10.

more than one instructive example of the magnitude of such "obstinate conservatism."

It is a marked peculiarity of manuals of instruction, that, no matter with what far-sightedness such regulations may have been originally compiled, they become antiquated in a comparatively short time. Napoleon estimated this period at ten years. Frequent changes are certainly not desirable, if tactical development is not to be interfered with and if inconveniences are to be avoided in organizing our mobile army from our peace organizations, Reservists, and Landwehr. On the other hand, the regulations must keep abreast of requirements if the conditions to which they owe their existence have changed. In his "Military Fantasies" the Prince de Ligne wrote in 1783: "An article which should be added to all drill regulations, and which, I know not why, is omitted, is: 'Act sometimes contrary to the regulations.' It is just as necessary to teach that one must act contrary to the regulations, as to teach the disorder of troops as it will occur in action."

It is always dangerous to be behind the times, as troops thereby relinquish a superiority previously possessed over others, which knowledge they must later purchase, with streams of blood, in the face of hostile bullets. Of what avail, to the Austrians in 1866, to the Russians in 1877, were all their valiant assaults, made with tactical formations that had outlived their usefulness in the face of newer weapons, although made with the firm determination to conquer?

The self-sacrificing spirit and firmly rooted discipline of the troops found an insurmountable obstacle in the rapid fire of unshaken infantry. The war experiences of our regiments show that bullets quickly write a new tactics, demolish superannuated formations and create new ones. But

at what a sacrifice!* In the Franco-German war, superior leadership and a better artillery permitted us to pay this price for the lesson. But how an army fares when it lacks these auxiliaries is shown by the British experiences in South Africa. The initial failure of accustomed tactical formations causes a dread of the frontal attack and finally leads some tacticians to deny entirely even the feasibility of such an attack. In peace training, therefore, set forms are of less importance; stress should be laid on developing the faculty of adaptation to changing conditions of combat and terrain.

Further development and justification of the principles of the drill regulations, and the modification of those principles under certain assumptions, are reserved to the science of tactics. Drill regulations should not be textbooks of tactics, but, on the other hand, a textbook of tactics should deal with formations only in so far as that is necessary to ensure a clear comprehension of the fundamental principles.

"Regulations and the science of combat are in a certain sense very different subjects. The regulations are law, authority—no doubt can be entertained on this point; but that also invests them with the character of something fixed, at least for a certain space of time. They cannot be kept up to date so as to meet quickly enough the rapidly changing and ever growing demands of modern combat: that would indeed be an unfair requirement, impossible of realization. Here must enter the science of combat, which should be independent in every direction, which should know no fixed rules, and which should point to no other authority than that of truth and reality. It is not the province of the science of

*It is frequently customary on the outbreak of a war to issue "Instructions for campaign," in order to prepare troops, trained according to superannuated regulations, for action on a strange theater of war. It is desirable to disseminate the first experiences gained in action to all parts of the army. We failed to do this in 1870, and all organizations were therefore compelled to gain this experience for themselves. Even as late as the 18th of August, 1870, the Füsilier Battalion of the 85th Infantry advanced in double column formed on the center, although the campaign in Bohemia had already demonstrated that this formation was out of date. See MOLTKE, *Feldzug von 1859*, p. 65.

combat, like that of regulations, to retain that which is in keeping with prevailing views and forms; it must take into consideration the fleeting theory and practice. ever developing and changing anew."*

A positive system of tactics will therefore be based upon one's own drill regulations, from the standpoint of which it will investigate and compare the principles of the service manuals of the different powers, and finally develop the science still further by the aid of experience gained from military history and the knowledge of the effect of weapons. While these are the ever changing but nevertheless measurable factors of tactical reflection, a third, perhaps the most important factor, must be added, viz., that the leader must reckon with the action of men frequently exposed to the influence of great exertions and great mental agitation. *A doctrine of tactics which does not properly appreciate the psychological element degenerates into lifeless pedantry.*

* KEIM, *Gegenwärtiger Stand der Gefechtslehre*, p. 1.

THE

FORMAL TACTICS

OF

INFANTRY.

THE FORMAL TACTICS OF INFANTRY.

I. ORGANIZATION AND EQUIPMENT.

1. THE IMPORTANCE AND EMPLOYMENT OF INFANTRY.

In all modern armies infantry is, in virtue of its numbers and importance, the principal arm. Since the introduction of firearms, infantry has gradually increased in importance and numbers as compared with the other arms.

In the Thirty Years' war, the proportion of cavalry to infantry was as 1:1, or 1:2, and frequently the cavalry even predominated. In the Swedish army one gun per 1,000 men was considered sufficient. During the era of linear tactics in the 18th Century the proportion between the two principal arms had become as 1:2 and 1:3; in the Napoleonic wars as 1:6 and 1:8. The number of guns was increased to 4 per 1,000 men. In the course of a campaign the ratio changes to the disadvantage of infantry. At the outbreak of the war of 1870-71, the relative proportions of the three arms in the German IInd Army were as follows: cavalry to infantry as 1:8; and 3.4 guns per 1,000 men. The proportion between the two principal arms in the IIIrd Army Corps of the German army, at the outbreak of the Franco-German war, was as 1:18.8; on the first day of the battle of Le Mans it was as 1:16.6; at the opening of the campaign there were 4.6 guns per 1,000 men, at the close of the campaign 5.8 guns per 1,000 men. This was still more marked in the Ist Bavarian Army Corps, which, on October 31st, had 5.8 guns and on December 9th even 11.1 guns per 1,000 men. At present Germany has approximately 6, and France 3.63 guns per 1,000 infantry.

The manner in which infantry fights imprints its distinguishing mark on the tactics of an entire period; thus, according to the combat formations of infantry, we may speak of a period of "linear," "column," and "extended order" tactics. Infantry can be equipped more cheaply and trained

more quickly than the other arms. In July, 1870, the French army consisted of 116 infantry regiments and 21 rifle battalions, but 38 rifle battalions were raised in addition to a large number of regiments of *gardes mobiles* and volunteers.

Infantry is as well adapted for combat with firearms as for combat with the bayonet, for attack as for defense, for action in close as in extended order. It can fight on any terrain which is at all passable, and is more independent of weather and seasons than the other arms; it surpasses the other arms in endurance, a man, on account of his will power, bearing privations and exertions better than a horse. On the other hand, the losses suffered by foot troops in action and through exertions on the march are greater than those of the mounted arms.*

The rate of march of infantry is so slow that in reconnaissance it can only by great exertions attain results which a small force of cavalry would obtain without appreciable effort. Infantry acting alone therefore unquestionably requires the assignment of mounted men for reconnaissance and messenger duty. As regards reconnaissance, infantry is like a man walking in the dark, who can guard against collisions only by stretching out his hand and feeling his way.

The lack of artillery support will also make itself felt when infantry encounters fire at ranges at which it is defenseless, owing to the limited range of its rifle. Infantry cannot dispense with artillery when it has to attack localities or fortified points in villages.

The infantry of the 19th Century fell heir to the distinction made in the 18th Century between heavy infantry (infantry of the line) and light infantry, the latter being employed only in skirmish duty and in the service of security. In the 18th Century the expensive method of recruiting by

*Percentages of cases of sickness in the campaign 1870/71:

Infantry:	69.8;	Field Officers:	13.26;	Captains:	10.19;	Lieutenants:	3.65%
Artillery:	57.7;	" "	4.04;	"	4.84;	"	4.52"
Cavalry:	37.5;	" "	5.61;	"	2.29;	"	3.24"

means of bounties made it necessary to avoid using troops in indecisive, costly fire actions, and to preserve the expensive personnel for decisive shock action *en masse*. Skirmishing was left to volunteer battalions, to Jägers, and to Füsiliers. In Prussia the number of Füsilier battalions was increased to 24 at the close of the 18th Century. Napoleon I. was, on principle, opposed to the theory of light infantry. He demanded but one species of infantry, "a good infantry." In spite of this, however, he became the originator of an *élite* infantry, when, for reasons of discipline, he created one *voltigeur* and one *grenadier* company in each battalion. While battalion tactics predominated, *i. e.*, until the close of the campaign of 1866, this arrangement was imitated in most states. At the time of the Russo-Turkish war, Russia still had in each battalion a fifth company, one of sharpshooters, which, though not recruited at the expense of the other companies, was formed of better material and received special training in extended order fighting. Following the example set by Austria, Prussia, in 1812, designated the third rank principally for extended order fighting, by forming it into a third platoon in each company when in action. This was called the sharpshooters' platoon and was composed of the best shots and the most skillful men of the company. As late as the campaign of 1866 there were instances of the employment of the combined sharpshooter platoons of a battalion. Here we have an actual *élite* force assembled in provisional organizations, not at the expense of the rest of the troops, however.

The system of column tactics, which required that every company should be equally skilled in extended order fighting, led to the abolishment of *élite* companies. The Prussian *élite*, consisting of the platoons formed from the third rank, although not always compatible with the employment of company columns, was not abolished until 1876. The experience of the Franco-German war had shown that, in view of the

extensive use of extended order formations, an independent employment of single platoons was out of the question, as in the course of an action the firing line absorbs not only entire companies, but regiments and brigades; and, moreover, that every platoon, as a unit for fire action, must possess those elements which will carry it forward even after its leader has fallen.

Napoleon formed his Guards by selecting men and officers from the entire army for use as a battle reserve. By granting them privileges and by loading them with distinctions, he attached them to his person, and they assumed the character of household troops of a dynasty.

The Prussian and Russian Guards are differently constituted. They are not, strictly speaking, *corps d'élite,* for they are not selected from the ranks of the army. While it is true that the Prussian Guard receives a better class of recruits and the composition of its corps of officers and the selection of its commanders guarantee conspicuous results, its principal superiority lies in the fact that it serves constantly under the eye of the emperor.

Since the introduction of accurate breechloading weapons, and their use by all infantry, Jägers and riflemen have no tactical excuse for existing, except where they are specially trained in mountain warfare (*Chasseurs alpins, Alpini*)*, or where they are intended to serve as a support for cavalry divisions. (France). While Jäger-battalions are at present employed like the rest of the infantry, they are retained by us as such because of tradition and for reasons of organization (they are recruited from forestry personnel), and an attempt is made in their tactical employment to turn their excellent marksmanship and skill in the use of ground to good account whenever possible. Jägers will be employed in defense, preferably for holding important points, and for com-

*See *Über Gebirgstruppen*, VI, p. 273, and also *Schweizerische Monatsschrift für Offiziere aller Waffen*, 1907, May to July.

v. GRAEVENITZ, *Beiheft zum Militär-Wochenblatt*, 1903.

bat and service of security on difficult terrain. Military experience has shown, however, that in actual war it was seldom possible to take advantage of these special characteristics; that in most cases the Jägers were used as other infantry, and that infantry units fighting shoulder to shoulder with Jägers accomplished as good results as the latter. Since the war of 1866 the demand for special employment of Jägers has ceased. The brief course of the campaign of 1866, in which our infantry acted mostly on the offensive, gave the Jägers an opportunity for profitable employment only where, contrary to accepted notions, they fought side by side with the rest of the infantry.*

Mountain warfare presents such difficult problems to troops, requires a sum total of endurance, energy and intelligence, physical qualifications and special familiarity, that neither every recruit nor every unit of the army will quite fulfill all its demands, although the experience of Suworov, during his campaign in the Alps, apparently contradicts this statement. Many disadvantages can be neutralized by peace training and discipline, of course, but training alone will not suffice. For overcoming the difficulties peculiar to mountain warfare, a suitable equipment permitting free movement, and at the same time ensuring the comfort of the men while at

*The 6th Jäger-Battalion on July 3rd at Sendrasitz; the 4th Jäger-Battalion at Podol; the 5th at Skalitz; the Jägers of the Guard at Lipa; or where during an action a reverse threw us on the defensive (1st Jäger-Battalion at Trautenau, and also at Rosberitz). The superior commanders, in attempting to assign them a special role, frequently employed them unprofitably in taking up rallying positions (3rd, 7th, and 8th Jäger-Battalions on July 3rd), sometimes even to escort baggage (3rd and 4th Companies of the Jägers of the Guard at Soor; and the 1st and 4th Companies of the 5th Jäger-Battalion at Schweinschädel); or they distributed them along the whole front for the purpose of conducting extended order fighting. When they were thus distributed among infantry organizations their efforts merged with those of the infantry.

For example, at Königgrätz half companies of Jägers were posted on both flanks of the Guard Infantry Division, and the 2nd Jäger-Battalion was on this day distributed by companies along the front of the entire division.

v. MOLTKE, *Kritische Aufsätze zur Geschichte des Feldzuges von 1866.*

KUNZ, *Die Tätigkeit der deutschen Jäger-Bataillone im Kriege 1870/71.* On page 169, et seq, a number of excellent examples are recorded (for instance: 5th Prussian Jäger-Battalion in the actions on November 29th and 30th, 1870, and on January 19th, 1871, in siege positions in front of Paris).

rest, is necessary. The lack of such mountain equipment is keenly felt even during short exercises lasting only a few days. Even Switzerland plans at present the formation of three mountain brigades. Austria already has special mountain brigades assembled for mountain warfare in its Kaiser-Jäger, Rural Riflemen, and also in the troops of Bosnia and Dalmatia. The Italian *Alpini* (consisting of 22 battalions in time of peace, to which militia companies are attached on mobilization, and which have in addition a reserve of 22 territorial companies) form a selected corps which is doubtless capable of accomplishing excellent results. The Italians propose to attach machine guns to these units. It is worthy of note that these troops carry explosives. In France the troops garrisoned in the Alpine districts are divided into thirteen groups, each consisting of one battalion, one mountain battery, one engineer company, and machine guns.

As modern fire effect makes it impossible for mounted officers to direct the firing line, it was natural to use the more improved means of communication, the telephone and telegraph, in addition to the visual signals employed by the navy.

The improvements made in weapons have had a further influence on the transformation of the infantry. Even a small force of infantry can with its magazine fire inflict annihilating losses in a very short time on closed bodies offering favorable targets, especially when this fire is delivered from a flanking position. This requires, on the one hand, that greater attention be paid during combat to local reconnaissance, which can be but imperfectly made by mounted officers with the troops, and, on the other hand, it necessitates the employment of smaller independent detachments for our own security and for harassing the enemy. Intimately connected herewith is the introduction of machine guns, possessing great mobility, which enables them to take advantage of rapidly passing moments for pouring a heavy fire on the

enemy and also for reinforcing the independent cavalry in advance of the army.

In England it was decided to form mounted infantry charged with the additional duty of augmenting the fire of a cavalry division, and of furnishing the commander-in-chief with a reserve possessing the requisite mobility to permit its being thrown to any threatened point of the long battle lines of today. But of what importance is the fire of a single battalion in the large armies of the present day? The principal drawback to the employment of mounted infantry is, however, that, when mounted, it is defenseless against cavalry, and that, while in motion, it really needs a supporting force. In the Boer war the mounted infantry grew finally to a strength of 50,000 men. As it was not confronted by cavalry, it made good during the execution of wide turning movements, which Lord Roberts employed with success for the purpose of striking the flank of the Boers, who always rapidly extended their lines. In spite of these good services, it could not be denied that mounted infantry had many faults. The men knew nothing of the care of their mounts, as is evidenced by the large percentage of horses that became unserviceable. As mounted infantry units were improvised bodies, they lacked the requisite training in marching and tactical employment. After the war had lasted for some time, the mounted infantrymen, however, had completely forgotten their infantry character and deported themselves like cavalrymen, even if only as poor ones. Thus, toward the close of the campaign, numerous mounted charges were made by British mounted infantry, and, strange as it may seem, also by the Boers.

In this experiment of creating mounted infantry, all those drawbacks which had been learned for centuries were exemplified. As an improvisation, mounted infantry disturbs the cohesion of organizations; if permanently organized, it must become cavalry, just as the dragoons became cavalry:

for mounted infantry is neither flesh, fish, nor fowl and cannot endure.

The British Drill Regulations (1904) for mounted infantry lay down the following principles for its employment:

In the practical employment of mounted infantry, sight must not be lost of the fact that this arm is drilled and trained as infantry. On account of its greater mobility, it should be able to cover greater distances, and, in addition, be capable of executing wider turning movements than infantry. As a rule, mounted infantry is to be used in the following cases:

(a) It is to perform the service of security in the immediate front of infantry divisions in conjunction with cavalry and the horse batteries assigned to the latter, in addition to augmenting the fire of the cavalry. It is further to occupy, as expeditiously as possible, tactically important positions. It is to find positions from which it can bring fire, preferably flanking fire, to bear on the flanks of hostile cavalry before the actual combat begins. It is to improve every success gained and constitute a formed nucleus in case of a retreat. Moreover, mounted infantry should enable the cavalry divisions, far in advance of the army, to devote themselves exclusively to the strategical reconnaissance with which they are charged.

(b) In addition, the mounted infantry is to constitute a light mobile reserve which the commander-in-chief can despatch at a moment's notice from one wing to the other for the purpose of lending assistance, or for influencing the action at particular points and for which other troops are not available on account of the extraordinary extension of modern lines of battle.

(c) Finally, mounted infantry is to fill the rôle of a mobile column in minor warfare or in expeditions in colonial wars, and in performing this duty assume the functions of the absent cavalry in the service of reconnaissance and patrolling.

The following is the organization and strength of mounted infantry organizations:

In war, every infantry battalion is to furnish one company of mounted infantry, consisting of 5 officers, 138 men, and 144 horses; and every brigade (4 battalions) one battalion of four companies. To each battalion of mounted infantry is assigned: one machine gun platoon, consisting of two guns and two ammunition carts (2 officers, 40 men, and 54 horses). Hence the aggregate strength of a battalion of mounted infantry is 28 officers, 630 men, and 676 horses.

The creation of mounted infantry is proper only where climatic conditions make long marches by European troops impossible, or in cases where the arrival of a few soldiers at distant points will exert a potent influence on the actions of

an opponent. As shown by our experience in Southwest Africa, the proper field for mounted infantry is colonial (guerrilla) warfare, especially when it is important to prevent the outbreak of threatened disorders and to let the country return quickly to a state of peace upon completion of the principal actions. On European theaters of war, space is lacking for the employment of mounted infantry, and, moreover, there are not enough horses. In organizing mounted infantry, an auxiliary arm, which can be of use only occasionally, has been created at the expense of infantry and cavalry. The infantry itself should endeavor to meet all demands for local reconnaissance and communication, without weakening the cavalry for its principal duties, and without, in so doing, crippling its own fighting efficiency.

For the purpose of reconnaissance, patrols or scouting detachments are used. Their usefulness in difficult country and in enterprises against the enemy's flank or rear cannot be denied. In minor operations, by advancing on side roads, they can hamper the enemy's reconnaissance, secure the flanks of their own force, ascertain the probable extent of the prospective battlefield, and, finally, having gained a firm foothold, they can become very annoying to the hostile artillery. In a large battle the necessary elbow room for such employment is lacking. To form special organizations of picked men, as is done in Russia, is always of doubtful value. An organization cannot dispense with its best men in action; it needs them as group leaders and as substitutes for disabled non-commissioned officers. While everything goes without a hitch, the withdrawal of good men from an organization is of little importance; the drawbacks to this procedure become apparent, however, when heavy losses deplete the ranks, when the line begins to waver, when, in the absence of officers, only the example of courageous men prevents the weak-kneed from running away. Our regulations properly appreciate the importance of psychological impressions during critical combat situations; they state: "The man who feels his

courage and coolness going, in the excitement of battle, should look toward his officers. Should they have fallen, he will find plenty of non-commissioned officers and brave privates whose example will revive his courage." (Par. 268 German I. D. R.). If it becomes necessary to despatch a stronger infantry force on a mission of minor importance, it will usually be better to detail an entire company than to improvise a detachment whose leader would know his men only imperfectly. From the standpoint of training, scouting detachments have an entirely different value. They give young infantry officers, who are tied to a command, an opportunity to develop self-confidence, decision, and tactical judgment; to cope with hardships and difficulties on their own responsibility. In this manner characteristics may be developed in the young officers which will be of benefit to them in a large battle. It is obvious that scouts should be assigned bicycles to give them the mobility which infantry lacks.

If the roads are good, cyclists* will frequently be able to take the place of cavalry in messenger service. In this case they remain with their organizations and perform the same duties as the other soldiers. The employment of cyclists is in accord with the principle that in war every resource the country offers for warfare should be utilized. The advantage of the use of cyclists for messenger service and their value to the command generally is obvious; they are, in addition, adapted for reconnaissance work and for reinforcing the divisional cavalry. Cyclists, however, do not lend themselves to the formation of separate organizations for battle purposes (each division has 110 cyclists), for a large number of picked men would thereby be withdrawn from the ranks of the troops engaged. An improvised cyclist detachment would, in addition, accomplish very little, as it would lack the thorough peace training requisite for cohesive action as an organiza-

*Pars. 78, 82, 86, 99, 101, 132, 151, 152, 194 and 200, GERMAN F. S. R.

tion. If the opinion is entertained that cyclist detachments could furnish substantial aid to the cavalry* in advance of the army, that they could be employed profitably in the supply districts and in minor operations, and, finally, if the available material in the country is to be utilized, nothing remains but to proceed to the creation of cyclist companies in time of peace. The material necessary for repairs and for ammunition supply can only be entrusted to permanent organizations. The advantages of cyclists are their great mobility,† their prompt readiness for firing, and, above all else, the noiselessness of their movements. Their weakness lies in their dependence upon a complicated machine, in the comparatively large road space taken up by them on the march (100 cyclists in column of twos take up about 250 to 300 m. road space), and in their dependence on the terrain. The last mentioned drawback can be remedied apparently only by the adoption of a folding wheel, but, since the cyclist's equipment cannot be secured on the machine, it is better in difficult country to push the wheels or to leave them behind under guard when necessary.

In Italy, France, and England more has been done towards the formation of cyclist detachments than elsewhere. In Italy each *Bersaglieri* Regiment has one company of cyclists, which is to be employed in supporting a cavalry brigade. Cyclists have accomplished a good deal in surmounting difficulties of the terrain. In England the development of cyclist bodies is left mostly to the volunteers and their exercises have demonstrated that such units are capable of expanding in a brief space of time.

In France the cyclist movement is led by Major Gerard, who rendered valuable service during a short maneuver of the cavalry division (1905). Opinions are as yet divided as to the advisability of forming cyclist

*By occupying positions so as to give the cavalry freedom of action; by advancing ahead of the reconnoitering cavalry for the purpose of re-establishing contact with the enemy, of forestalling him in occupying important points, or of outflanking him; finally, by coöperating with cavalry in cavalry combats, in covering a retreat, in outpost duty, and during the execution of technical work.

†According to the *Italian Regulations of 1904*, the rate of march of cyclists is as follows: slow rate 8 km., maneuvering rate, 10—12 km., road speed, 12—17 km., accelerated rate of march, up to 20 km. per hour. Cyclists can ride up to 80 km., without long rests. For riding 90—100 km., from 5 to 6 hours are required.

battalions. Both Major Gerard and General Langlois are advocates of their employment. General Langlois desires to oppose the brutal German battle tactics with rapid maneuvers of mobile reserves which he would form of cyclist battalions, artillery, and cavalry.

According to the Cyclist Regulations dated September 10th, 1904, the cyclist company is to be looked upon as infantry, which is capable of moving at great speed, but is tied to the network of roads. The cyclist companies are principally intended for defensive action, holding an important point until the arrival of infantry. They are also to serve as support for cavalry and artillery, but are not adapted for reconnaissance work. Since it is difficult for them to secure their flanks on the march, they are to be used mainly in combination with other arms.

In winter campaigns, when wheel and horse cannot be used, recourse is had to the Canadian snowshoe (a web shoe) or to the Norwegian snowshoe or ski (skee). In France, Italy, Austria,* Norway, Sweden, and Switzerland marching on snowshoes is assiduously practiced, while in Germany the troops have so far done little in this line. The ski is, however. coming more and more into vogue among the rural population of the German mountains.

Deep snow is an effective obstacle for troops not equipped with snowshoes. This is not entirely due to the fact that the march is retarded, but to the unusual difficulties attending the service of security. Covering bodies are stalled. Besides, the difficulties of maintaining communication with neighboring detachments are increased when valleys or ab-

*One of the most remarkable snowshoe marches ever recorded is without doubt that made by the ski detachment of the 4th Regiment of Tirolese Kaiser-Jägers (Austria) stationed in Salzburg. In June, 1905, this detachment, consisting of 4 officers, 15 men and 4 guides, all with field equipment, marched around the base of the "Grosz Glockner," via Mittersil, Felber-Tauern (elev. 2,500 m.), Windisch-Matrey, Lienz. Dolsack, Hochtor (elev. 2,570 m.), into the Fuscher valley, despite violent cyclonic snow storms, a journey which, even in mid-summer, can only be undertaken by experienced tourists. In several of these detachments experiments were made with white covers for uniform and equipment, which enabled individual men and patrols to approach unseen to within 200 to 300 m. of an opponent.

rupt declivities intervene between the forces. The only remedy in such cases is to employ the snowshoe, upon which one can move rapidly without regard to roads, and up or down hill without difficulty. Patrols can be despatched to adequate distances from the marching body on skis alone. Ski-runners can perform the same duty which cavalry performs on the plain; for instance, they can occupy points in advance which are of importance to us, dispute crossings with the enemy, and hold him at bay. Ski detachments alone are able to reconnoiter the condition of roads and test the carrying power of snow in advance of a command, and they alone can furnish the connecting links in an extended outpost position, because they alone are able to move off the roads. During halts they furnish guards; in action they easily turn the enemy's flanks, reconnoiter his weak points as well as the position of his reserves; and after the fight they maintain contact with him as patrols. They can hasten forward in advance of a command and prepare cantonments and bivouacs, and attend to the cooking.

The great depth of a detachment of ski-runners is a disadvantage. Each ski-runner takes up 2.20 m., and in addition a distance of 1 m. must be left between men. Besides, as the men are not all equally skilled in using skis, the road space taken up by a detachment of runners is increased considerably. This necessitates the employment of small detachments not exceeding 100 men. The proper sphere of ski-runners is patrol duty. In winter campaigns ski-runners are a necessary substitute for cavalry. In Scandinavia reconnaissance detachments are composed of ski-runners and cavalry, the horses pulling the runners. This permits a very rapid movement over snow-covered ground and may also be employed where the use of the much slower sled is impracticable owing to the nature of the terrain. Much practice is undoubtedly necessary to acquire proficiency

in this sport*, for it surely cannot be easy to preserve an upright position on skis behind a galloping horse, while at the same time overcoming all the difficulties of the ground. When troopers cannot continue to perform reconnaissance work, they are replaced by snowshoe or ski-runners. The snowshoe performances in France, since the establishment by War Department order of a training school in Briançon, are worthy of note. According to the experiences gained at that institution, a period of four weeks is ample for training men for extended mountain marches. On January 18th, 1904, a body of men on snowshoes covered a distance of 80 km., including a climb of 1,700 m., in 20 hours (4 hours' rest included).

2. THE TACTICAL UNIT.

By the term tactical unit is meant the smallest element of a body of troops capable of sustaining an action independently, of performing a simple combat task, and the elements of which (man and horse) are personally known to the leader. Moreover, the tactical unit should be small enough to allow of its being controlled by the voice of a single leader. This requirement limits the battle front of the tactical unit to about 100 m., which corresponds approximately to the front of an escadron (*Eskadron*)† in line, or to that of a battery of six pieces. The frontage of the tactical unit of cavalry might with advantage be decreased, while that of artillery, on account of its stability in action, might be extended, were it not for the fact that the increase in the quantity of matériel and in the number of horses involved in such extension would make the supervision of the unit too

*During the Norse winter sports of 1905, the winner covered a distance of 67 km. in 2¾ hours.

†The term *Eskadron* has been rendered by *"Escadron"* in this work. The German *escadron* consists of 6 officers, 166 men, and 180 horses. It is the tactical, as well as the smallest administrative unit of the German cavalry and is divided into four Züge (platoons). *Translator.*

difficult for a single person. In nearly all large armies the strength of an escadron of cavalry and of a field battery is approximately 150 horses.* This corresponds approximately to what the farmer of nothern Germany considers suitable to keep together in one establishment. If the estate is larger, requiring more than 150 men and horses, subsidiary farms† are established.

While column tactics were in vogue, the above mentioned requirements of a tactical unit were completely fulfilled by the battalion, but this is no longer the case. It is quite impossible for one voice to control the movements of a battalion in action; this is scarcely possible in case of a company. On the other hand, a company is too weak to carry out an independent mission in action. Nothing less than a battalion possesses the requisite fighting power, strength, and capacity for subdivision, to sustain an action independently, to solve minor problems of combat, and to remain a body full of fighting efficiency even after sustaining serious losses such as are unavoidable in every modern infantry action.

To attempt a further definition of the term "tactical unit" would be of little value. General von Scherff in a logical manner‡ constructs a "troop unit"¶ from "fighting groups"§ (squad of infantry or cavalry, or one gun), several of which form a "fighting unit"‖ (company, troop or battery), "possessing the requisite power to carry out a specific task," and placed under the command of a responsible leader. "The definition of a fighting unit includes, on principle, its indivisibility in action. Dispersion is a crime, di-

*GENERAL MARMONT, in his *Esprit des Institutions Militaires*, p. 41, states that experience has shown that the most suitable strength for an escadron is 48 files, divided into four platoons; but, he recommends that platoons should consist of 16—18 files in order to maintain this strength throughout a campaign.

†*Vorwerke.*

‡*Von der Kriegführung*, p. 49.

¶*Truppeneinheit.*

§*Kampfgruppen.*

‖*Kampfeinheit.*

vision at least an evil." The "combat unit"* consists of a number of fighting units. "The commander of the combat unit (infantry battalion, cavalry regiment, or artillery battalion) should be able to lead it as a compact entity, and should have the power of employing its component parts independently for combined action against some point." General von Scherff has found imitators in Austria, where the term body of troops (*Truppenkörper*) is applied to an organization having the necessary means for feeding, clothing, and equipping the men, and which is composed of a number of "basic units."† Such "basic units" as can be supervised, handled, and controlled directly by one leader, who knows the individual men thereof and their characteristics, are the escadron, battery, and company. Von Boguslawski‡ applies the term "fighting unit" to organizations from the company (escadron) to the brigade, which act in accordance with the tactics of their arm, supported by the other arms, in the sphere assigned to them by orders or by circumstances. Divisions, which, by the coöperation of the three arms, are capable of independent employment on the march and in action, he calls "combat units." According to Boguslawski, army corps are "battle units,"¶ with which the commander reckons in battle, and which are strong enough to meet an energetic attack or to execute one themselves.

3. ORGANIZATION.

The basic unit of infantry is the company, from 200 to 250 men strong in the larger armies. It seems hardly practicable to exceed a strength of 150 men, as this is about the greatest number in which a relation based upon personal influence of the leader on his subordinates can still be ob-

*Gefechtseinheit.

†Schlachteneinheiten.

‡Entwickelung der Taktik, III, p. 125.

¶Grundeinheiten.

tained. In armies in which companies are composed of more than 200 men, the numbers in excess of this figure may be regarded as a margin of safety, intended to maintain the company at a strength of 200 rifles after the first casualties of a campaign, produced by marching, detached service and battle losses. In view of the losses, which frequently increase with extraordinary rapidity in modern battles, it appears undesirable to fix a lower figure than that above mentioned, as the companies would otherwise lose their independence and could no longer be considered basic units.

	Company.	(*a*) PEACE STRENGTH.						(*b*) WAR STRENGTH.							Difference between minimum peace strength and war strength.		
		Officers.	N. C. O.	Musicians.	Privates.	Officers' Servants.	Hosp. Corps Men.	Officers.	N. C. O.	Musicians.	Privates.	Train Soldiers.	Litter Bearers.	Hosp. Corps Men.	Officers.	N. C. O.	Privates.
GERMANY	Minimum.....	4	15	4	128	.	.	5	20	4	226	4	4	1	1	5	103
	Maximum	5	17	4	142	.	.	.	.	.	.	.	.	.	.	.	.
AUSTRIA	Minimum	4	11	2	76	4	.	4	19	4	195	.	4	.	.	5	132
	Maximum	4	14	2	109	4	.	.	.	.	4 Pioneers.		4 officers' servants.				
ITALY	Infantry, Bersaglieri.....	3	13	...	87	.	.	5	16	.	180	.	.	.	2	3	93
		Musicians (trumpeters only) and sappers armed with rifle.															
	Alpini	4	19	...	121	.	.	.	.	.	.	.	.	.	.	.	.
FRANCE	Ordinary	3	15	2	108	.	.	4	28	4	218	.	2	1	1	18	110
	Maximum	3	15	2	158	.	.	.	.	.	.	.	.	.	.	.	.
	Chasseurs.....	3	21	2	125 and 150	.	.	.	.	.	.	.	.	.	.	.	.
RUSSIA	Approximately.	3	7	...	96	4 *	.	4	22	.	200	non-combatants. .	20	.	1	15	104

*In addition, five non-combatants.

After the heavy losses at **St. Privat,** two companies were combined into one for tactical purposes in some regiments of the Guard Corps. The administration of the consolidated companies had to remain distinct on account of the preparation of casualty lists, recommendations for promotion and decorations. On the day of the battle of **Orleans,** the strength of the German battalions varied from 459 men in the Ist Bavarian Army Corps to 747 men in the 40th Infantry Brigade. During the pursuit after the battle of **Le Mans,** the strength of the 56th Füsilier-Battalion was even reduced to 280 men.

The actual training of troops must be completed in the company. Combat by an independent company is the exception; combat by battalion the rule. By the consolidation of four companies into one unit, the battalion, consisting of 800—1,000 rifles, is formed. The French Chasseur battalions are the only ones that consist of six companies, because their proposed independent employment, for instance, in mountain warfare, makes it more often necessary to detach small units than is the case in operations on more favorable terrain.

As, in the course of time, the independence of companies in action developed, and as the combat of the battalion as an entity was transformed into combined action of the four companies, the strength of the company increased from 120 to 250 rifles while the number of companies in a battalion diminished. The battalion of Frederick the Great was divided for administrative purposes into five companies and for tactical purposes into eight *pelotons.* The battalion of the first empire consisted of six *Füsilier* and two *Voltigeur* companies, and the Austrian battalion, until the reorganization after 1866, consisted of six companies of which each two formed a division. Until 1866 the six company battalion predominated in the infantry of all European armies (France, Italy, Austria, and the minor German states), but early in the seventies most of the states adopted the four company battalion, Russia being the last to do this (four line and one sharpshooter company). In the regulations of 1812, Prussia had adopted the four company battalion. The independent employment of the four united sharpshooter platoons of a battalion was the exception even during the campaign of 1866. At present only the British battalion consists of eight companies, which cannot, however, be said to possess a capacity for independent action on account of their small size.

In the four-company organization the battalion possesses an asset which enables it to adapt itself easily to any combat situation. The battalion organization is the out-

growth of practical necessity; the regimental commander cannot handle 12—16 companies without difficulty, and an intermediate unit, the battalion, is necessary. The battalion is the practical, and the regiment, consisting of 3 or 4 battalions, the ideal unit. Regiments consisting of two battalions do not possess the same advantages, as the regimental staff becomes superfluous during each necessary division of the regiment. Two battalion regiments do indeed facilitate command; they are, however, more expensive in time of peace and are of advantage in action only when formed into brigades of six battalions each, in which case the commander has a compactly organized reserve available.

"The regiment, by reason of its history, the uniformity of its training, the *esprit de corps* of its officers, and its division into three battalions—thereby facilitating subdivision —is pre-eminently fitted for carrying out definite combat tasks." (Par. 470 German I. D. R.). A glance at the map of the battle of Vionville (5B of the German General Staff work on the Franco-German war) shows that regiments, whenever they entered the field intact, fought as unbroken units throughout the battle, whereas brigade organizations were frequently broken up.

This breaking up of brigades is practically induced by the two regiment brigade organization. (Par. 471 German I. D. R.). When once the brigade commander has assigned sections or points of attack to his regiments, there remains very little for him to do. He can form a reserve only by taking two battalions from one regiment, or one battalion from each. The brigade is, however, not like the regiment, an entity of bodies of troops, but a unit assembled for tactical purposes, which may, without regard to the whole, be increased or diminished by one or more battalions in case of necessity. On the march and in action the brigade organization as a subdivision of the division cannot always be maintained; groups are frequently formed in which the nor-

mal units must be broken up. In large battles the brigade is the largest force which may yet be employed as an intact unit, although the employment of infantry by regiments will continue to be the rule. Brigade commanders are necessary for decreasing units of command and desirable for relieving the division commanders of a part of their work. In time of peace brigade commanders are useful for directing recruitment and, moreover, as connecting links between regiments and the division. The unmistakable advantages of the three-battalion organization have induced the United States to form its brigades of three regiments, each of three battalions (of 400 men each). An English division consists of three brigades of four battalions each.

4. INTRENCHING TOOL EQUIPMENT.*

Earth as a covering material and, incidental thereto, the adoption of the small spade after the Russo-Turkish war, have increased in importance owing to the greater penetrating power of the modern infantry bullets. The disadvantages of the spade lie in the danger of its being misused and in the consequent impairment of offensive spirit. There is, moreover, danger that the fire effect will be impaired and subordinated to considerations of cover. The spade should therefore not be employed on every occasion, but only when the tactical purpose in view requires it.

What the weight of the portable intrenching equipment of the Japanese, Russian, and British infantry will be, is still undecided, but experiments are being made with a uniform tool. When we consider, that for the purpose of intrenching, one man requires a space of 1.20 m., and for handling his rifle a space of 0.8 m., and that when intrenching under fire all the men cannot work, it is obvious that it would be im-

*In the Russo-Japanese war the Russian companies were equipped with 80 small spades and 20 hand axes; the Japanese companies with 68 small spades, 17 mattocks, 8 hatchets, and 30 wire cutters.

practicable to equip each man with an intrenching tool. According to all experience, it is sufficient to furnish every other man with spade or pick. In addition to this, however, a company requires a large number of wire cutters. Only the French infantry is equipped with explosives, every regiment having 108 cartridges.

The following table shows the intrenching tool equipment available in each battalion:

	FOR EARTH WORK.				FOR TIMBER WORK.		
	Small Intrenching Tools.		Large Intrenching Tools.		Small Intrenching Tools	Large	
	Spades	Mattocks.	Spades.	Picks.	Hatchets.	Axes.	Total.
Germany	400..	40	20	10	35	8	513
Austria .	400..	64	8	16	.....	8*	.....
Italy †...	32..	8	36	18	.....	62	.....
France‡.	448..	128	.....	.....	.....	.....	.....

5. THE LOAD OF THE INFANTRYMAN.

The load carried by the infantryman should not exceed one-third of the man's weight (84 kg.), or not more than 28 kg. According to the "Regulations for the Employment of Infantry Equipment, M/95," the load of a soldier whose height is 1.67 m. (the equipment consisting of new experimental pieces) is about 27 kg., distributed as follows:

*Each company has 4 pioneers, which carry intrenching and carpenter tools in addition to their rifles. These men are formed into a pioneer platoon of 64 men in each regiment.

†The adoption of portable intrenching tools, 50 spades and 12—15 mattocks per company, is contemplated.

‡The following demolition tools are available in each battalion: 64 picks, 64 fascine knives, and 16 wire cutters. Sappeur sections carry in addition a mattock or a pick apiece, and each ammunition carrier also carries a pick, a fascine knife, or a saw. The large intrenching tools are apparently being changed at the present moment.

Clothing ...	5.397 kg.
Equipment*.	3,964 "
Baggage† ..	5.600 "
Arms and ammunition	8.507 "
Rations (including breakfast).	3.238 "
Total. . . .	26.706 kg.

To this must be added intrenching tools:

Small spade and scabbard	0.89 kg.
Hatchet.	1.08 "
Mattock.	1.48 "
Load with spade.....	27.596 "

COMPARISON.‡

	Without spades.	With spades.	Clothing	Weight of knapsacks.	Weight of rifles.	Weight of ammunition. ‖
Germany	26.706	27.596	5.397	20.919	4.707	4.714 kg.
Austria¶	26.615	26.443	4.428	22.187	4.200	4.080 "
Russia ..	28.216	29.206	4.000	22.622	4.576	3.426 "
France ..	26.125	.....	6.222	19.903	5.049	3.675 "
Italy	29.135§	.....	5.993	23.143	4.505	4.320 "
Japan ...	26.365	.....	3.475	22.890	4.435	3.600 "

*Tent equipment 1.620 kg.

†Iron ration, 2.388 kg. The British soldier carries only a 269 g. ration on his person, sufficient for 26 hours. It consists of two parts, one containing cocoa paste, the other concentrated extract of beef (Pemmican).

‡According to *Journal of Military Scientific Societies*, 1906.

¶Depending on whether the man carries intrenching tools (front rank only) cooking utensils (rear rank and a few men of the front rank).

§Alpini carry 32.096 kg.

‖Italy 162, Japan and Germany 150, the other states 120 rounds per man.

II. THE FORMATIONS.

1. THE ISSUE OF ORDERS.

Troops are set in motion by words of command, and, when these do not suffice, by orders. (Orders give information of the situation and the intentions of the commander, and assign tasks, but leave the recipient free to choose the method of carrying them out). When commands are given from a distance, time and energy may be saved by employing the telephone and visual signals. To these may be added shouts, signs, and the following signals: *To advance,* the leader raises the arm; to indicate that the command is *to follow him,* he extends his raised arm in the direction of march; *to halt,* he lowers the arm; *to deploy,* both arms are raised laterally to the height of the shoulders, and if necessary the direction the skirmish line is to take is subsequently indicated with one extended arm; *to assemble* his men, the leader describes a circle above his head with one arm. These signals may also be made with the sabre or rifle. Additional signals should be agreed upon beforehand in each separate case. If a signal is made to a body of troops in close order, it is meant, in the first place, for its leader. (Par. 11 German I. D. R.). Other signals, such as those indicating a change of direction of march, or a change in the battle formation, must be specially agreed upon beforehand. Trumpet signals are only used by troops in garrison at drills, and in barracks or billets as service calls. To prevent troops from misunderstanding signals or from obeying those not intended for them, all trumpet calls in battle, except "charge," "fix bayonet," and "attention," are forbidden.

During the engagement of **Trautenau** (27th June, 1866), the trumpet signal "assemble," given at another point, caused four Prussian battalions to withdraw.* See also the effect of the signal "assemble" after the taking of **Problus.**† Notice the effect of the signal "form square" during the assault on the **Forest of Bor (Königgrätz).**‡

On the morning of June 26th, 1866 (day of rest), reveille sounded by a trumpeter was mistaken for an alarm signal. The 7th Infantry Division assembled and the signal was repeated in two other army corps. Two days previous another useless alarm had occurred because a trumpeter, surprised by a number of Radetzky Hussars, had blown the alarm signal.¶

The village of **Dilets** (action at **Gitschin,** 1866) was to be evacuated at the sounding of the signal (Saxon) "First Brigade withdraw." The signal was, however, understood and carried out by only three battalions; two battalions, which were at the time engaged, did not hear it at all and maintained their position until they were taken in reverse by hostile fire and forced to withdraw.§

In the crisis of the fight of the Füsilier Battalion of the 48th Infantry and the Ist Battalion of the 52nd at **Vionville,** the signal "assemble" was sounded and repeated by other trumpeters, further mischief being averted by the energetic efforts of the officers who prevented trumpeters from blowing the call and ordered them to blow "commence firing" instead.‖

2. THE PURPOSE OF FORMATIONS. COMPARISON BETWEEN LINE AND COLUMN.

The object of assembly formations is to unite troops, usually prior to a movement, in a restricted space permitting an easy survey of the entire body. Assembly formations serve also the purpose of placing troops in readiness before starting on a march, before beginning an action, and for moving them on the battlefield when out of reach of hostile fire (columns). Route formations should permit an orderly, comfortable march of the troops, as much of the available width of road being used as possible, a space being

*KÜHNE, *Kritische Wanderungen,* 3, 2nd Edition, pp. 55 and 85.

†*Geschichte des Infanterie-Regiments Nr. 16,* p. 230.

‡*Geschichte des Infanterie-Regiments Nr. 57,* p. 47. HÖNIG, *Untersuchungen über die Taktik der Zukunft,* 4th Edition, p. 61.

¶*Geschichte des Regiments Nr. 66,* pp. 48/49.

§*Anteil des Königlich-Sächsischen Armeekorps,* p. 130.

‖*Geschichte des Regiments Nr. 52,* p. 59.

left for orderlies and mounted messengers, and for troops which are drawn forward. In order to permit a prompt deployment of troops for action, it is necessary to reduce their depth. Columns only are suitable for moving troops. The situation existing at the moment will determine to what extent allowances may be made for the comfort of the troops, or how far considerations of comfort should be ignored in view of readiness for action, and to what extent the depth of the columns should be decreased.

The formations for moving troops (to be employed in marching across country and to be used on the battlefield) should be such as to cause the least discomfort to the troops, should make it possible to avoid obstacles, to utilize cover, facilitate changes of front and direction of march, and permit a prompt deployment in any direction. These formations are columns unless the hostile fire effect makes a deployment into line necessary.

Battle formations should be such as to permit the employment of all weapons (rifles, lances, sabres, and guns). This requirement is not satisfied by columns, but only by the line. Modern fire effect excludes every employment of close order formations under effective hostile fire and compels the most extensive deployment.

Whether line or column is the preferable battle formation is a question belonging to a bygone age. The battles of the British in Spain and at Waterloo, the engagement at Groszbeeren, and the attack of the six battalions of Borke's Brigade (the 8th) at the Katzbach,* amply demonstrate that the defeat of the Prussians at Jena was not due to the employment of linear battle formations alone. In a fight with an equal opponent, formed in columns, well trained and disciplined troops, formed in line that allows of the use of all the rifles and is suitable for shock action as well, have always carried off the victory.† On the other hand, in the bat-

*FRIEDRICH, *Herbstfeldzug, 1813*, I, p. 305.

†RENARD, *Considérations sur la tactique de l'infanterie en Europe*, Paris, 1857.

RÜSTOW, *Geschichte der Infanterie*, II, p. 316.

tles of the Empire we find columns formed, which of necessity excluded a large part of the men from participation in the action, but which were designed to break through the hostile battle line by sheer momentum. At Wagram, Macdonald's Corps was formed with eight deployed battalions in rear of each other in a single column, supported on the flanks by seven and eight battalions respectively, also in column. At Austerlitz and Waterloo we find attack formations in which from eight to twelve battalions of a division were deployed one in rear of the other at distances of twenty paces. Column and line must be examined with reference to their mobility, their vulnerability and their fire and shock power.

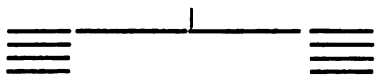
The column possesses greater mobility and is better adapted than the line for executing changes of front and for taking advantage of the cover afforded by the ground. In a column steadiness and shock power (produced by the crowding forward of the ranks in rear) and the influence exerted by the officers, is greater than in a line.

The line is more dependent on the terrain in its movements. The characteristics of the line are great frontal fire power, weakness of the flanks, difficulty of quickly changing front, and the ever present danger of being pierced. The line has been called the formation of the bold, the column that of the weak.

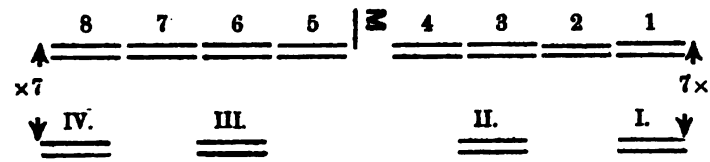
The column* was proposed as a battle formation in France as early as 1774 by Mesnil Durand, but did not find practical application until the wars of the Revolution. In those wars columns were used because the raw levies lacked the training necessary for making movements in line. Whenever a line formation was used, battalions, owing to the scarcity of efficient officers, resolved themselves into disorderly skirmish lines which were exceedingly difficult to control. The adoption of the column was, therefore, the result of practical experience, but as a formation it could be justified on the battlefield only so long as it remained capable of development for the purpose of firing. The endeavor to combine the advantages of column and line by a combination of both formations led to the

*The development of the French column tactics is splendidly portrayed by KUHL in his work *Bonapartes erster Feldzug, 1796*, p. 46, et seq.

placing of columns in rear of the wings of the battalions deployed in line. This formation was employed for the first time in the attack made by a demi-brigade during the battle on the **Tagliamento** (1797), and subsequently it was used at **Marengo** (attack made by Desaix's Division).



During the first decade of the 19th Century the French leaders had a marked *penchant* for this formation, until it sank more and more into insignificance in face of the deep column. (Ney at **Waterloo,** and Macdonald at **Wagram**). Formations suggesting the above are found even in the Prussian regulations of 1876. (Posting of sharpshooter platoons of the companies at first in rear of the wings of the deployed battalion, and later in rear of the outer flank platoons of the companies).



On account of the increased penetrating power of infantry projectiles, especially at short ranges, a column will suffer greater losses than a line; at longer ranges the curvature of the trajectory causes bullets which pass over the first echelon to strike the second or third. On ground falling with respect to the line of sight, lines, and on ground rising with respect to the line of sight, columns are exposed to greater losses when they come within the beaten zone.*

*At 1000 m., the projectile of rifle model '98 falls 5 cm. for each meter of the range, and at 1200 m. it falls 6 cm. per meter of the range, so that the second and third platoons of a company in column of platoons (7.2 m. distance between platoons) would offer a target having a vulnerable surface 35 cm. high (1/5 the height of a man), at 1000 m., 42 cm. high (¼ the height of a man) at 1200 m.

3. THE COMPANY.

(a) Formation of the Company.

(Par. 83 German I. D. R.).

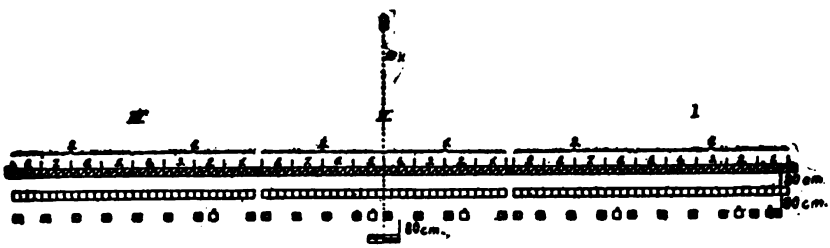
In the company the files are placed in two ranks according to height from right to left. Each four files form a squad or group, and the entire company is divided into three platoons (*Züge*). When a platoon consists of more than three squads it is divided into two sections (*Halbzüge*).

In the normal formation of the company, the three platoons, each in two ranks,* are posted on a line in numerical order from right to left. This formation facilitates firing and in garrison meets the requirements of barrack life, each two squads forming a section (*Korporalschaft*) under a non-commissioned officer. During the campaign of 1866 Prince Frederick Charles gave permission to arrange companies so that friends and relatives could serve together in the same squad or section. A company formed in this fashion would, of course, not look so well on parade as one formed regularly, the men according to height from right to left flank, but it would without doubt give a better account of itself in action. For details of the formation of a company and division into fractions see pars. 82—85, German I. D. R. The squad leaders and the two range finders in each platoon are

*The number of ranks is intimately related to the rate of fire of the infantry weapon. During the days of slow loading, the necessity of keeping at least a part of the rifles at all times ready for firing led the Imperialists in the Thirty Years' war (loading was executed by 99 motions) to form their musketeers into sixteen ranks, while Gustavus Adolphus was able to form his infantry into six ranks owing to the greater loading facility of their rifles. In the Seven Years' war the Prussian infantry was formed in three, that of the Austrians in four ranks, the fourth rank serving as a reserve. The first rank fired kneeling. The British infantry was the first to adopt the two rank formation for fire action, forming into four ranks for shock action and frequently for warding off cavalry attacks. Emperor Napoleon considered a third rank useless for fire and shock action and initiated the double rank formation on the eve of the battle of Leipzig. In 1888 the Prussian infantry—the last to do so—gave up the three rank formation which had long since lost its importance in battle and which was retained side by side with the double rank formation for purposes of parade only.

posted as file closers at facing distance in rear of the rear rank of the company.

Germany.



The *non-commissioned officers* are posted in the front rank, on the flanks and in the center of the platoons in Russia, Austria, and Switzerland. In Germany and Italy they are all posted in rear of the line as file closers, and it is their duty to supervise the men. In France a part of the non-commissioned officers are posted in the front rank, the remainder as file closers. A German company of 200 men has a front of 100 paces, or 80 m. The infantryman with field equipment occupies a space about 75 cm. square.

The German Infantry Drill Regulations define interval (*intervalle*) as the space between two elements on the same line, and distance as the space between two elements in the direction of depth. An interval is measured from the left flank of the element on the right to the right flank of the element on the left (or vice versa); and distance in the company and in the battalion is measured from the rear of the element in front to the head of the element in rear (or vice versa). If the distance between two elements is equal to their front, the column is called an "open column", otherwise it is called a "close column."

FRONT AND FACING DISTANCE.

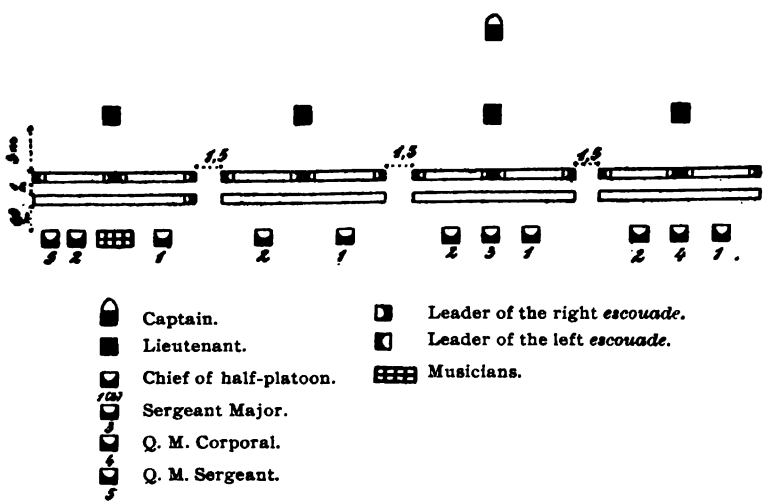
	FRONT. (Per man.)	FACING DISTANCE. (Distance between ranks.)
Germany....	About 0.80 m. Loose elbow contact.	0.80 m. from back of front rank man to breast of rear rank man.
Austria.....	About 0.75 m. Files are separated by an interval of the width of a hand.	120 cm. from heels of front rank man to those of rear rank man (according to German method of measuring, about 0.88 m.).
Italy	0.70 m.	0.75 m. from breast of front rank man to breast of rear rank man (according to German method of measuring, 0.45 m.) on the march, 1.20 m. (according to German method of measuring, 0.90).
France	0.70 m. including 0.15 m. interval between files.	1 m. from back or knapsack of front rank man to breast of rear rank man.
Russia.....	0.70 m. Files are separated by an interval of the width of a hand.	Rear rank man is an arm's length from back of knapsack of front rank man = 60—70 cm.
England.....	About 0.80 m.	1.50 m. from heel of front rank man to heel of rear rank man (according to German method of measuring, about 1.20 m.).
Switzerland..	About 0.75 m.	0.80 m. from back of front rank man to breast of rear rank man.
Belgium	About 0.80 m.	1 m. from heel of front rank man to heel of rear rank man (according to German method of measuring, about 0.70 m.).
Japan	About 0.85 m.	0.75 m. from back (or knapsack) of front rank man to breast of rear rank man.

(b) Division of the Company Into Three or Four Platoons.

In Austria, France, and Italy, platoons are considered as distinct bodies, so long as they have sufficient numerical strength. They are placed side by side and constitute the company in line. In Germany and Russia the company is at

each formation divided into platoons of approximately equal strength. In the armies of Austria, France, and Italy, it is contended that the soldier has nothing further to learn when once he is taken up for duty in the company. All movements are executed, after preparatory commands given by the company commanders, by commands of execution or signals given by platoon commanders. The execution of movements is retarded by this procedure and the movement itself becomes clumsy. It would also seem that the multiplicity of commands in the simple, oft-repeated movements, is superfluous, especially in the weak platoons at peace strength.

France.



Column of platoons from line (par. 121 German I. D. R.: "Form column of platoons") is formed in Austria as follows (Austrian I. D. R. par. 360): At the preparatory command, "Column," given by the company commander, the leaders of the 1st, 3rd, and 4th platoons command at once, as in forming column of fours to the front, "Fours right (left), column right (left)." At the command "march," the platoons step off, each turning in column to the rear, and are conducted to their new positions, halted, and dressed to the right (left).

The companies of all powers, those of Germany, Japan, and Belgium excepted, are divided into four platoons; each two platoons may in addition be combined into a half-company. The German, Japanese, and Belgian companies are divided into three platoons. "The platoon is not an independent subdivision by reason of the mere fact that it consists of a certain number of men, but because the term platoon denotes a force led by a man of superior intelligence. The officer commanding the platoon makes it what it should be. The strength of the platoon is therefore solely dependent upon the number of officers available." (VON SCHERFF).

The obvious advantage of the three-platoon organization of the company is that fewer platoon commanders are required, which fact is well worthy of attention in the mobilization of units of both Line and Reserve, especially in view of the extraordinarily heavy casualties among the troop leaders in the course of a campaign.*

It is only necessary to recall the situation of the Guard Corps and of the IIIrd Army Corps after the battles around **Metz**, and the condition of the German troops during the advance to **Le Mans**. On January 7th, 1871, there were 36 officers with the 57th Infantry, of which 16 led platoons of the 36 platoons in the first line, and 8 lieutenants commanded companies. On mobilizing, 25 lieutenants were assigned as platoon commanders and six as company commanders in the 57th Infantry.†

The eight infantry regiments and the Jäger-Battalion of the Xth Army Corps had, at this time, instead of the required 506 officers, only 286, of which number 174 were for duty. The 22nd Infantry Division had only 108 officers left; companies and even half-battalions were led into action by very young officers of the Reserve, and, on many occasions, even by vice 1st sergeants.

On the morning of August 17th, 1870, the 40th Füsilier Regiment had two field officers and four captains present for duty. Two captains, two first lieutenants and eight second lieutenants (four of these belonging to the Reserve), led companies; only two lieutenants of the Reserve, one cadet, and four vice 1st sergeants remained available for duty as platoon commanders. The regiment participated in the battle of **Gravelotte** with this

*See also *Taktik*, V, pp. 81, 88.

†HÖNIG, *Gefechtsbilder*, I, p. 25. For additional facts in regard to the dwindling of the number of officers consult *Die sieben Tage von Le Mans*, by V. D. GOLTZ; also *Supplement to Militär-Wochenblatt*, 1873, p. 868; also VON KORTZFLEISCH, *Feldzug an der Loire*, p. 43.

small number of officers.* The 6th Grenadier Regiment, which, in July, 1870, had marched out with four field officers, seven captains, six first, 14 second lieutenants, and four cadets, all on the active list, lost so many officers at **Wörth** and **Sedan** that a field officer of the 46th Infantry had to take command of the regiment; three first lieutenants of battalions; and four second lieutenants, two officers of the Reserve, and six vice 1st sergeants of the companies. The 12 companies had available five vice 1st sergeants as platoon commanders. The Ist Battalion of the 58th Infantry had only seven officers left (including its commander and the adjutant) after its losses at **Weissenburg.**†

The 7th Grenadier Regiment lost 40 officers at **Weissenburg** and **Wörth.** On August 7th, three captains commanded the battalions and three officers of the 5th Jäger-Battalion were detailed to command companies in it.‡ At **Gravelotte** the Füsilier-Battalion of the 1st, the Ist Battalion of the 2nd, and the IInd Battalion of the 3rd Regiment of the Guard lost all of their officers. The French organizations, having more officers and less men than we, were by no means so badly off in 1870-71. Upon mobilizing in 1870, the German army had 13.7 officers to every 1,000 men, the French army, 32.2 officers.

On the other hand, it should be remembered that in armies consisting of militia it is considerably more difficult to command a platoon of 60—70 men than to command one of 40—50 men. A disadvantage inseparably connected with the four-platoon company is the small size of the platoons during peace exercises. On account of this circumstance most regulations permit the three-platoon formation when the company is small, because platoons consisting of less than ten files are of no instructional value. An advantage of the three-platoon company is the simplicity and rapidity with which changes from one formation to another may be effected.

The three-unit column of platoons is very broad for movements on the battlefield. It offers, when numbering 200 rifles, a target about 25 m. wide and only 15 m. deep. The four-unit column of platoons is better suited for movements. With a front of 17 m., its depth is only 15 m., when the

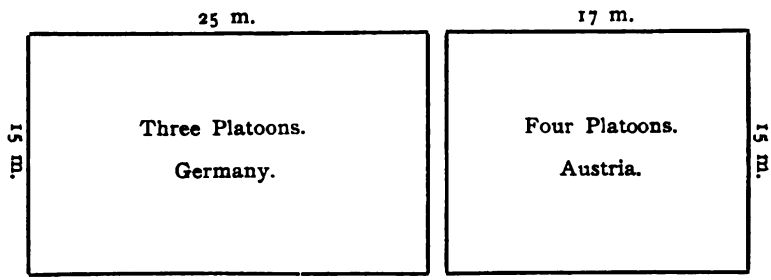
*KUNZ, *Kriegsgeschichtliche Beispiele*, 8/9, p. 162.

†*Geschichte des Regiments Nr. 58*, p. 56.

‡KUNZ, *Kriegsgeschichtliche Beispiele*, 14, p. 122.

distances between platoons are assumed to be 6 paces (Austria, France, Italy, Russia, 5 paces). (See p. 62).

For a company consisting of 200 rifles, the following would be the forms:



The other advantages praised by advocates of the four-unit company are:

1. That a smaller platoon is more suitable for field service—that a picket is perhaps only in the rarest cases to be made 60 men strong.

2. That a small platoon makes a better and more comprehensive employment of the company in action possible, as the company commander has an opportunity to use 1/4, 1/2, or 3/4 of his company according to the requirements of the situation, while the three-unit company affords less favorable combinations, permitting only an employment of 1/3 or 2/3 of its strength.

These advantages can also be obtained in the German company by the employment of sections (1/6, 1/3, 1/2, 2/3, 5/6) so that the objections to the three-unit company would appear to be groundless.

The platoons (in Italy called *plotone,* in France, *section*) are subdivided into sections (*demi-sections, Halbzüge*), in Austria into two skirmish groups (*Schwärme*) of 4—7 files each, and, when consisting of 16 files, into four skirmish groups (in Italy this is also done, the groups being called *squadriglio*). In Germany the platoons are divided into

groups or squads of four files each, and in Russia the platoons are divided into sections of 8—15 files each and these again into groups or squads of 4—6 men each. If the squad is to have any importance at all in action, it must have a leader, and it might easily happen that a mobilized company lacks the number of leaders necessary to provide one for each group. The withdrawal from the line of a number of good shots for duty as squad leaders is compensated for, in our opinion, by the more thorough supervision over the men. This consideration has, however, apparently caused other states (Austria and France) not to count on the activity of the squad leaders in a fire action to the same extent as is the case in Germany.

4. LENGTH OF PACE AND MARCHING.

An extended, swinging step, without haste and without unduly taxing the lungs, is advantageous in all movements. When accustomed to this pace on the drill ground, the men will march with practically the same step on varied ground, and this appears more desirable than to shorten the step, while at the same time increasing the distance to be covered in a given time. The length of the pace depends largely upon the height of the individual, but even small men can maintain a step of 0.80 m. without undue exertion.* In Switzerland the cadence has been fixed at 116—120 steps per minute "with a view of suiting the peculiarities and the varying degree of mobility which characterize the inhabitants of the different cantons." (!) For purely practical reasons it is advisable to fix upon some even number of paces in order

*When the leg is extended at an angle of 57 degrees the length of pace would be as follows:

Height of man.	Length of leg.	Length of foot.		Length of pace.
1.6 m.	0.8 m.	0.24 m.	=	0.75 m.
1.675 "	0.857 "	0.253 "	=	0.776 "
1.70 "	0.87 "	0.26 "	=	0.80 "
1.75 "	0.88 "	0.26 "	=	0.82 "

that the cadence may be tested with the watch. (Austria excepted). The longest pace in conjunction with the highest cadence (*Bersaglieri,* whose march is almost a double time, excepted) is found in England and Switzerland. Such a performance could not be kept up by a fully equipped man without impairing health.

	QUICK TIME.			ACCELERATED TIME.			DOUBLE TIME.		
		PER MINUTE.			PER MINUTE.			PER MINUTE.	
	Length of pace. m.	Number of paces.	m.	Length of pace. m.	Number of paces.	m.	Length of pace. m.	Number of paces.	m.
Germany	0.80	114	91.2	0.80	120	96.00	0.75–0.90	170 180	127 – 162
Austria.....	0.75	115	86.25	0.75	125	93.75	0.90	160	144
Italy, Line and Alpini..	0.75	120	90.00	.....	.....	.....	0.90	170	153
Bersaglieri...	0.86	140	120.	.....	.....	....	1.00	180	180
France	0.75	120	90.00	0.80	124	99.00	0.30*	180	136
Russia.....	0.71 0.89	118 122	84 – 109	0.71 0.89	122	119.	1.066	170– 181	181 – 192
Japan	0.75	114	85.5	.....	.....	.....	0.85	170	144
England.....	0.84	128	107.5	0.91	128	116.5	1.02	180	183.6
Switzerland..	0.80	116–120	92.8–96.00	0.80	120–140	96 –112	0.90	160	144

*The following, taken from *La marche du fantassin* (*Journal des sciences militaires, 1897*), is here inserted for comparison.

French Drill Reg. of 1791 (in force until 1862):
Pas ordinaire .... 100 paces at 0.65 m.=65 m. per minute
Frederick The Great's Infantry 75 " " 0.70 m.=52 m. " "

Prussian Drill Reg. of 1812:
Ordinary pace..... 75 " " 0.70 m.=52 m. " "
Accelerated pace..... 108 " " 0.70 m.=75.6 m. " "

In general, double time is considered of little value. In Austria double time is to be maintained for periods of two minutes, quick time of five minutes duration alternating, up to sixteen minutes, *i.e.*, until a distance of 1,726 m. has been covered. In Germany, an alternating quick and double time march in heavy marching order is prescribed. A different practice prevails in Italy. According to the Italian Regulations all troops are to be trained to march in double time without rest and without knapsacks for 2 kilometers (with knapsacks, 1 km.); *Bersaglieri* without knapsacks, 3 km. (with knapsacks, 1½ km.), also without rest (*i.e.*, 13 and 16.8 minutes respectively). When we consider that in double time with the necessary alternating step, 2,000 m. can be covered in 17 minutes, and in accelerated step, in 19—20 minutes, the time gained is unimportant when compared to the fatigue of the men and the exertion of the lungs, which interferes with deliberate, accurate firing. During an Austrian firing test the number of hits fell from 76.5%, attained while advancing in quick time, to 51% after a period of double time.

The run, without keeping step (*Marsch! Marsch!*) is employed in rapidly crossing short, fire-swept spaces, in changing quickly from one formation to another, and in the charge.

5. MOVEMENTS OF THE COMPANY IN LINE.

The commander of the center platoon is the guide.

A change of direction is effected by inclining toward the new direction (at the command: "Half right, march!" when the angular change of direction is less than 45 degrees), by indicating a new point to march on, or by executing a turn.

6. THE COLUMNS OF THE COMPANY; MOVEMENTS IN COLUMN; FORMATION OF LINE.

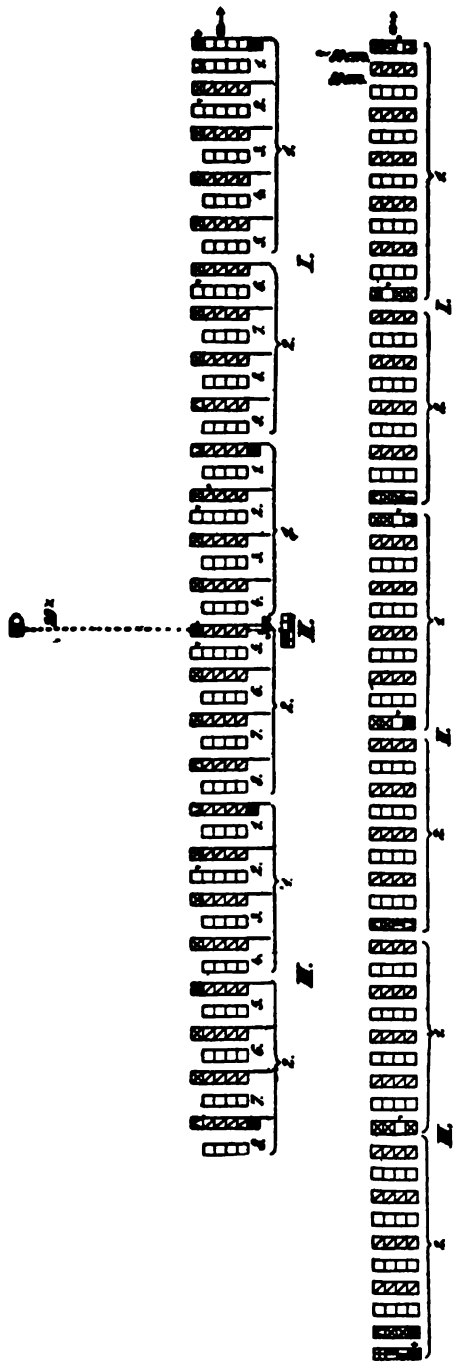
Column of Twos.*

Column of twos is formed by facing in the indicated direction. Marching at attention the depth of an organization in column of twos is equal to its front when in line. The column of twos is used in marching by the flank for short distances only, as the march at attention in this formation unduly fatigues the men. In addition, this formation may be used, in exceptional cases, on narrow roads; but the column becomes considerably elongated (as much as 165%), when marching at route step. Line is formed from column of twos either by facing, or by executing front into line.

*Rothenkolonne

Column of Squads.

This is an open column formed (the company being in line at a halt or in motion) by each squad executing a turn of 90 degrees. It may also be formed from line at a halt by the squad on the designated flank moving straight to the front, the others executing a turn of 90 degrees toward the proper flank, then following the leading squad.* Column of squads may also be formed by executing "Squads right (left), column right (left)." Line is formed by each squad executing a turn of 90 degrees or by executing front into line (without regard to the original front).



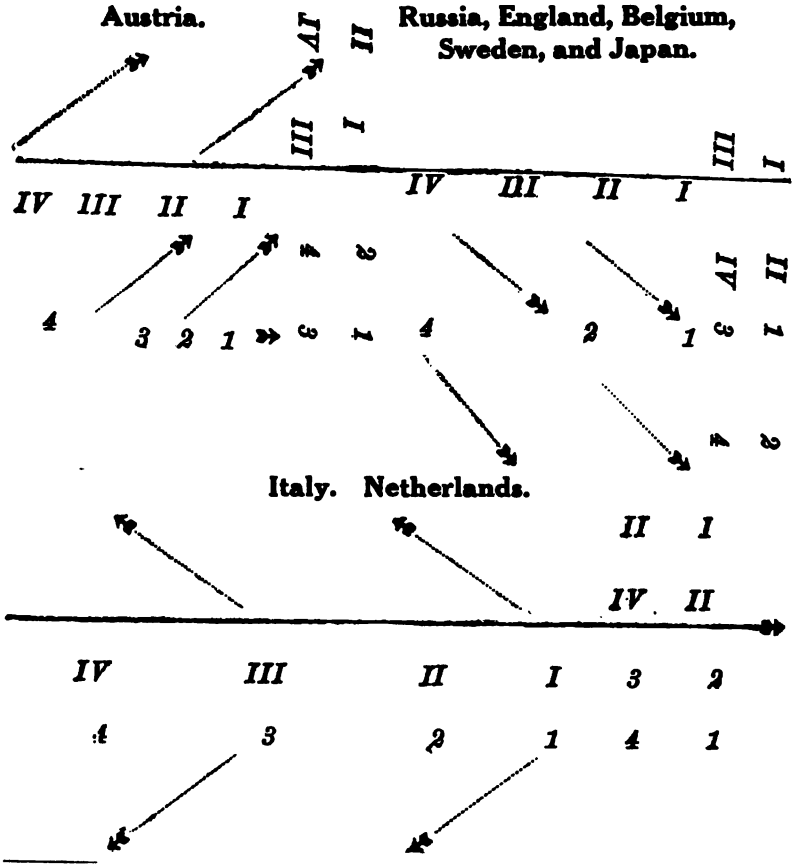
Route column is formed from column of squads by the squads in each section closing to facing distance, the file closers, musicians, and hospital corps men forming ranks of four men, in the gaps thus

*"Right (left) by squads." *Translator.*

created. (Par. 91 German I. D. R.) With the exception of Russia, which employs a section column, of Switzerland, which uses a column of squads, and of France, which has adopted a wheel by fours like that of the cavalry, all other armies employ the *column of fours** as their march formation.

Column of fours is, as a rule, formed as follows:

The even numbered men place themselves on the right or left of the odd numbered men by making an appropriate turn, thus forming a column of fours whose length is equal to the front of the company in line. In the plate below let the Roman numerals represent front rank men, the Arabic numerals rear rank men, and the horizontal line the original front occupied; column of fours will then be formed to the right, in the different states, as shown:



*Doppelreihenkolonne.

For the purpose of increasing the front of the column, the double column of squads, having a width of 8 files, may be employed. This is formed in practice by placing the columns of two organizations (companies or battalions) side by side. In large bodies of troops, the depth of a column is reduced in this manner by one-half. A column of fours formed by closing on the center instead of by wheeling to a flank, is employed in Italy and Russia for the purpose of reducing the front of an organization.

Comparison of Column of Fours with Column of Squads.

The column of fours has the advantage over our column of squads in that it can be more quickly and easily formed; that the front rank men must make a turn, while, at the same time, observing the march direction, can scarcely be considered a disadvantage.

The column of fours and the column of squads have the same depth. The Austrians consider movements made in column of fours on the battlefield more clumsy and fatiguing than when made in column of squads, because checks are transmitted to the whole column of fours owing to its rigidity, while in column of squads the march is easier, more rapid and more orderly. The squad organization, moreover, facilitates the employment of small parties in the service of security and increases the importance of the squad leader in fire action. For the last named reason we should not like to dispense with the column of squads.

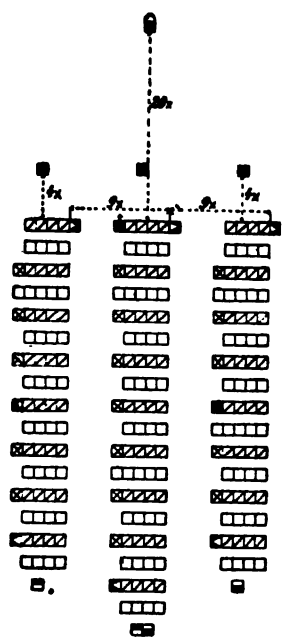
The Employment of the Column of Squads.

The route column is suitable for movements under frontal artillery fire, as the cone of dispersion of bursting time shrapnel combines small lateral spread with great effect in the direction of depth, and as it is very difficult for the opponent to observe whether a shot falls short or goes over, unless it strikes just in front of the column. When artillery can bring a flanking fire to bear on the column it becomes

necessary to neutralize this by placing the platoons side by side so as not to present a conspicuous target to the enemy.

Movements by the flank and changes of front are easily made in column of squads, and after some practice the deployment into line of skirmishers from this formation offers no difficulties. This column is best adapted for movements over varied ground. In column of squads difficult terrain can be crossed and advantage can be taken of the most insignificant cover. In addition, it is difficult for an enemy to observe a force moving in column of squads along the edge of woods and rows of trees, and such a column entails the least expenditure of energy on the part of the men. The leaders must insist, however, that the men cover in file, and that elongation of the column does not take place. The column of squads or the route column is therefore to be employed on the battlefield as long as possible.

A column of squads or route column may be shortened by placing the platoons, each in column of twos or squads, side by side. By this means the **Company Column** (*Kompagniekolonne*) is formed.



The normal interval between platoons in this formation, measured from the leading guide of one platoon to the leading guide of the next in line, is nine paces. This interval may be increased as required by the nature of the ground and the intended deployment for action (deployment on a broader front). Movements in company column are facilitated by the fact that platoon commanders are posted four paces in front of the center of their respective platoons. The leading squad follows the platoon leader, the guide of that squad moving directly in that officer's tracks. Thus,

small, unimportant deviations, unavoidable on varied ground, can easily be adjusted, while too definite rules would tend to restrict the mobility of the platoon commanders in front of their platoons. The principal thing is that the platoon follow its leader who guides it without command.

The musicians distribute themselves in rear of the platoons in readiness for their subsequent duty in action—that of maintaining communication between the several parts of the company. The intervals of nine paces between platoons are not rigid, but rather the reverse. The flexibility of the formation considerably facilitates movements in difficult country. This "meandering" of the company over the terrain requires special training. The old, historic company column, in which the platoons were formed in line one in rear of the other at a distance of nine paces (Russia 5 paces=3.55 m., Austria, Italy, France, 6 paces=4.50 m., and Japan, 8 paces=6 m.), their commanders on their respective right flanks. is now called the

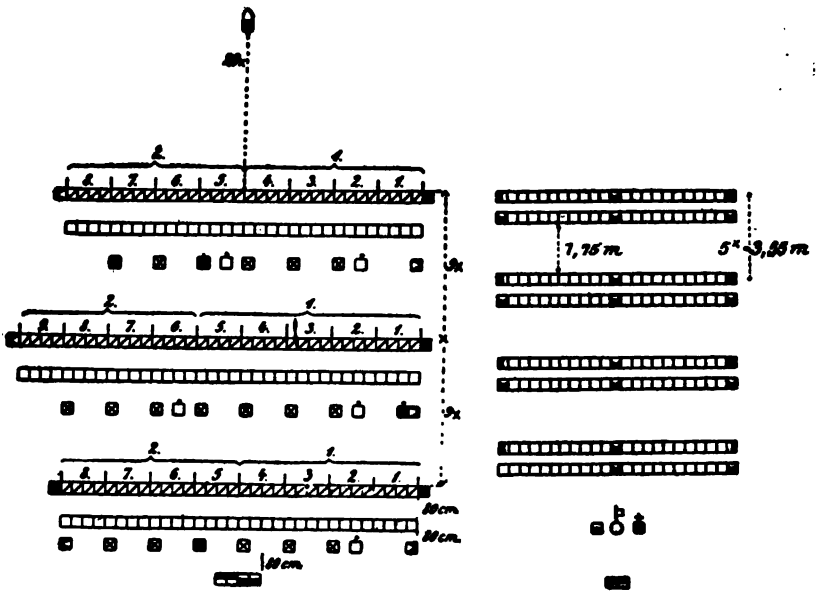
Column of Platoons.

Austria, France, and Italy have retained the old designation.

The front of the column of platoons may be decreased by forming column of sections. The column of sections is suitable as a route formation on broad roads; the transition from column of sections to column of squads is not difficult, and for the purpose of passing through occasional narrow stretches of road, the files on the flanks may be removed. In most cases it is, however, more desirable to place several columns abreast than to employ column of sections, because deployment is facilitated in the former case.

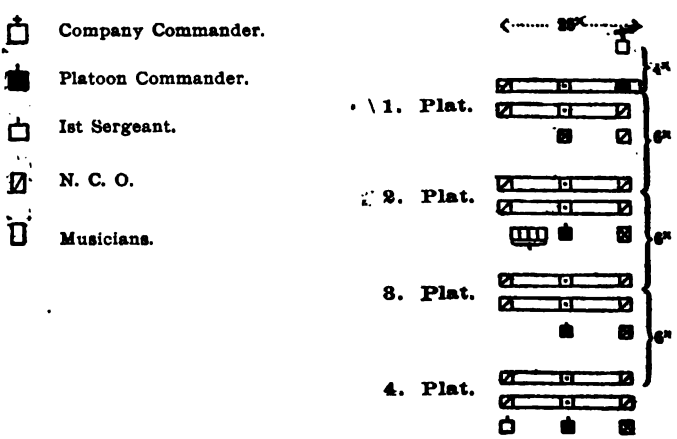
Company in Column of Platoons.

Germany. **Russia.**



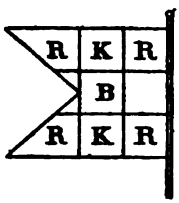
Russia. The four squad leaders of each platoon are posted on the flanks of the rear rank and in the center of each rank. The ranking non-commissioned officer of each platoon stands on the left flank of the front rank of his platoon. The 1st sergeant, the guidon bearer, and one trumpeter, and behind them two drummers, are posted in rear of the company.

Austria.



The staves of the guidon flags (*Jalonneurflaggen*) are inserted into the rifle barrel of a soldier (in case of a battalion into the rifle barrel of a N. C. O.) and serve to indicate battalions and companies.

According to the color scheme used in Russia: red = 1, blue = 2, white = 3, green = 4. "R" indicates the number of the regiment in the division, "B" the number of battalion, and "K" the number of the company. A red flag is carried by the 1st Company, and a red flag with one green horizontal and one blue vertical stripe is carried by the 8th Company of the 1st Regiment of an infantry division. In Japan and England so-called storm-flags (small national flags) have been adopted to facilitate mutual recognition of friendly troops.



Posts of Platoon Commanders.

In Switzerland, in Russia, and in Germany, the post of platoon commanders is on the flanks of their respective platoons when the company is in column of platoons. In England and Austria platoon commanders are posted in rear of their platoons, with the exception of the commander of the leading platoon, who is posted beside his guide. In all other states platoon commanders are posted in front of their platoons. Officers are posted in front of their platoons so as to facilitate observation on their part, and so that their platoons can follow them. This position becomes a necessity when the regulations require that all movements of the company be executed at commands given by platoon commanders. When they are posted in front of their platoons, they cannot supervise their men unless they turn around to do so.

The column of platoons is a close column from which line cannot be formed directly. It has not been found necessary in Germany to provide an open column permitting prompt deployment toward a flank. The column of platoons unites the company on the smallest space and facilitates supervision, but in companies at full war strength it is not well adapted for executing changes of front and for taking advantage of cover, on account of the size of the platoons (40

files each). In platoons at war strength the men look more toward the point upon which they are to march than upon the enemy, and the deployment of the rear platoons offers difficulties which occur principally when a deployment in an oblique direction or one by the whole company becomes necessary.

The column of platoons is formed by the flank platoons placing themselves in rear of the center platoon. Line is again formed by rear platoons moving to right and left and abreast of the leading platoon.

The German company column is much more flexible, and the advantage of a prompt deployment for action, made possible by the fact that all platoon commanders and the heads of platoons are in the lead and therefore can see the objective, should not be underestimated. The company column is formed from line by the center platoon forming column of squads to the front (or rear), the flank platoons, each in column of squads, closing on the center platoon, heads of the three columns on the same line. Company column is formed as follows from column of platoons: the leading platoon executes squads right (left), column left (right), the two rear platoons execute squads right (left), and are led to a position abreast of the leading platoon. Company column from column of squads is formed by rear platoons moving to the right and left respectively, and abreast of the leading platoon.

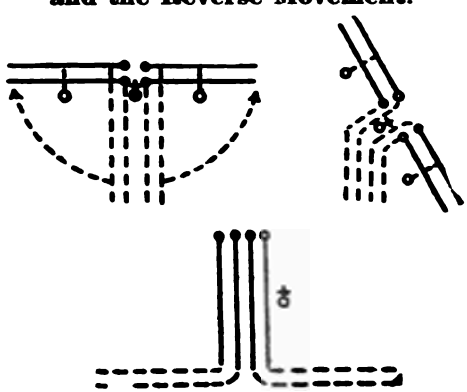
When line is to be formed from company column, the flank platoons have to incline to the right and left respectively in order to gain sufficient interval.

Movements in Column.

For marching short distances to a flank, column of twos may be employed; for longer distances, column of squads (or fours); and the march direction may be changed by inclining in the proper direction.

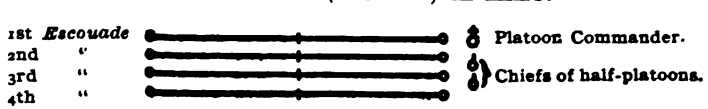
Since March 1904, experiments, which deserve to be mentioned here, have been made in France under the direction of Colonel Fumet, having for their object the simplification of the drill regulations. In the experiments a four-rank formation is being considered. In this proposed scheme the platoon is formed so as to place the four single-rank squads (*escouades*) in rear of each other at the very close facing distance of 0.50 m., the leaders of the *escouades* taking post on the right flank, a first class private being posted on each flank and in the center of each *escouade*.

Forming Double Rank from the Four-Rank Formation and the Reverse Movement.



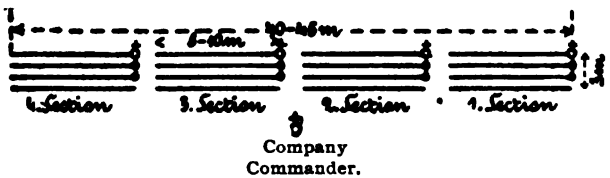
Deployment of a Half-Platoon formed in Four Ranks into Two Half-Platoons formed in Double Rank.

The Platoon (*section*) in Line.



Deployment of a Half-Platoon Into Line of Skirmishers.

The Company.



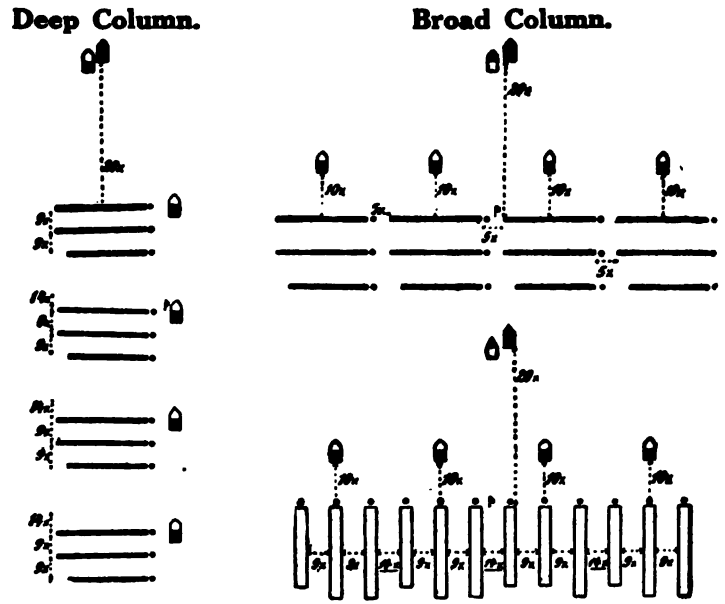
The platoon at war strength (50 men) has a front of 8—10 m. and a depth of 3 m. The movements are very simple. Route column is formed by simply facing to a flank, without first dividing the platoon into squads. Double rank line may be formed from column of fours, by executing right and left front into line. The double rank line may be deployed into half-platoons. Furthermore, a single rank line may be formed by the men of the rear rank stepping up into the front rank. One drawback of this scheme is, that, in forming route column, facing distance of 0.80 m. between ranks is to be gradually gained after stepping off. The deployment of half-platoons into line of skirmishers offers no difficulties. It is otherwise, however, when the platoon is formed in four ranks and marching in platoon front, for then line of skirmishers can be formed only by deploying each rank in turn. The depth of the column may be decreased by placing platoons (formed in column of twos or fours) abreast, this expedient affording a suitable route formation on broad roads. The company is formed by placing the platoons on a line and abreast of each other at intervals of 2 m. In the battalion, column of platoons and "mass" are the only formations considered. In the "mass" formation the companies, each in line, are in rear of each other.

7. THE BATTALION.

The movements of the battalion have been considerably simplified in all armies. Battalion drill is, however, necessary, since, as shown by the advance of the IInd Army on the morning of August 18th, 1870, simultaneous movements of large masses across country will be unavoidable in future wars on account of the great size of modern armies.*

Normal Formation of the German Battalion.

The four columns of platoons, or the company columns of a battalion, may be placed, as dictated by space or purpose, abreast of each other as a **broad column** (*Breitkolonne*), or in rear of each other as a **deep column** (*Tiefkolonne*). The numerical order of companies is immaterial.



*Additional examples: Advance of the 6th Infantry Division on Vionville. *Gen. St. W.*, I, p. 556. The flank march made by the 3rd and 4th Bavarian Brigades from La Maladerie toward Schloss Goury (5 km. battle of Loigny). HÖNIG, *Volkskrieg*, IV, p. 22.

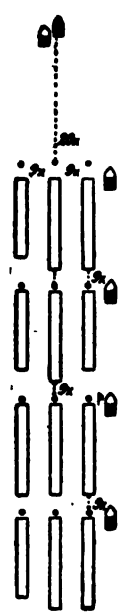
Advance of the 33rd Infantry Brigade from Champdoux against Loigny (*Ibid.*, IV, p. 80).

Advance of the 22nd Infantry Division from Lumeau on Poupry, 4.5 km. (*Ibid.*, IV, p. 189).

Advance of the French to the battle on December 1st, 1870 (*Ibid.*, III, p. 164).

The deep column is employed for assembling troops if the terrain necessitates a formation on a narrow front. If sufficient distance is allowed between companies, line may be formed to a flank, but this increases the depth of the column to such an extent that movements at attention are impossible. The deep column may be used as a route formation in addition to the column of squads. During the change from route formation to that of action, the deep column formation may be retained so long as the depth of the whole column does not have to be further reduced. When necessary, the deep column may be replaced by a formation in which the four companies, each in route column, are placed abreast of each other.

The broad column finds proper employment, aside from parades, in cases where the terrain or the contemplated deployment requires more front than depth. It is also advisable to assemble the widely scattered troops in a broad column after an action. The broad column does not lend itself, however, to the execution of changes of front by battalion; but should such changes of front become necessary, they are always to be executed by company.

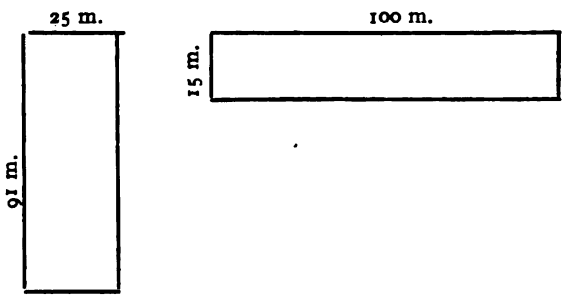


The color is posted between the right and left center companies, in broad column, and on the right flank of the third company, in deep column. In action the color remains with the company with which it happens to be at the moment.* Should this company also join the firing line, the color accompanies it; but under all circumstances one squad must remain with the color. (Par. 236 German I. D. R.). It has been contended that this is a disadvantage, as the enemy can direct his fire on the color and the men in its vicinity. If the colors, upon which the soldiers have been sworn, are taken into the field, it is always better to endure the unavoidable losses incidental to carrying them, and even to expose them to capture, than to send them back to a

*In Japan the color joins the battalion commander. British troops leave their colors in their garrisons. In Russia and France the color is carried only by one battalion of each regiment.

safe place under escort.* At the Albrechtshaus farm (Wörth) the colors served as rallying points around which the disordered skirmishers rapidly† assembled.

The figures given on pages 72 and 73 of the German Infantry Drill Regulations illustrate formations with organizations at peace strength. The approximate dimensions of broad and deep columns at war strength are as follows:



Russia. Numerous formations are prescribed. In addition to route column, columns with half company front and with company front are prescribed. Reserve columns are mentioned. These, according to the number of companies on the same line, are called single platoon column (deep column), two platoon column (double column), or four platoon column.

Austria. *The mass,* in which the companies of the battalion are or the same line, each company in company column‡ with intervals of three paces between companies, is employed for assembling the battalion in a restricted space in a position in readiness when out of range of hostile fire, or for assembling the battalion under cover. The *line of columns,* in which the companies, each in column or some other suitable formation, are formed abreast of each other at deploying intervals plus three paces, is also used.

The line. In this formation the companies, each in line, are placed abreast of each other at intervals of three paces.

The column. In this formation the companies are placed in rear of each other, each either in line or in column, with distances of nine paces

*See KUNZ, *Kriegsgeschichtliche Beispiele,* 14, p. 180, battle of Wörth. A platoon of the Füsilier-Battalion of the 47th Infantry was sent to the rear with the color, and a squad of the Füsilier-Battalion of the 46th Infantry finally had six colors to guard. In the 88th Infantry, out of a total of 48 sections, 9 sections remained in rear as a guard for 2 colors, but finally 6 of these sections crossed the Sauer.

†KUNZ, *Kriegsgeschichtliche Beispiele,* 13, pp. 77, 152.

‡In the Austrian company column (*Kompagniekolonne*), the platoons, each in line, are formed one in rear of the other. This formation was formerly called company column (*Kompagniekolonne*) by the Germans also, but at present they designate it by the term "column of platoons" (*Zugkolonne*). *Translator.*

between companies. The companies are numbered 1st, 2nd, 3rd, 4th, etc., from head to rear, if in column, and from right to left, if in line.

Italy. The formations are like those of Austria, but the double column has been retained.

Japan. The only formations prescribed are the broad and deep column.

France. The companies are formed in column or in *ligne de sections par quatre,* intervals and distances being 10 paces. Distances and intervals may be increased when required. The *battalion in line* in which the companies are formed in line in numerical order, abreast of each other at intervals of six paces, is only retained as a parade formation.

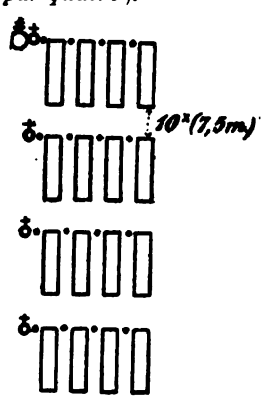
Line of company columns (*ligne de colonnes*). Companies abreast with intervals of six paces.

Deep column (*colonne de bataillon*). The companies in normal formation in rear of each other at distances of 10 paces.

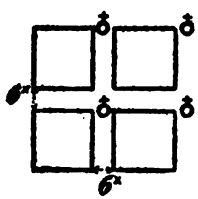
Double column (*colonne double*). Intervals and distances 10 paces.

The formation in which the companies are abreast of each other, each in column of fours at deploying intervals, is employed in marching across country and also under artillery fire. Only the regiment carries a color, the battalion a guidon (*fanion*).

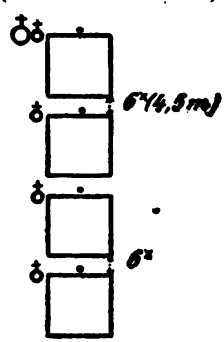
Deep Column
(*colonne de bataillon*).
The companies in line of platoons in column of fours (*ligne de sections par quatre*).



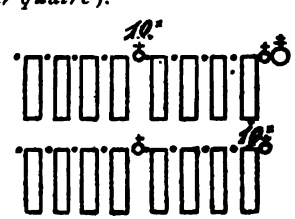
Double Column
(*colonne double*).



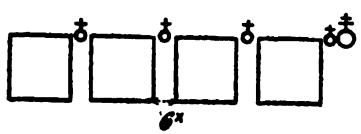
Deep Column
(*colonne de bataillon*).



Double Column
(*colonne double*).
The companies in line of platoons in column of fours (*ligne de sections par quatre*).



Line of Company Columns
(*ligne de colonnes*).



England. Columns are formed, in view of the (8) weak companies in a battalion, with company or half-company front at full or reduced distances (*quarter column*). In actions with savages echelon formations and the square are also employed.

Switzerland. The company is divided into four platoons. The line is used as an assembly formation and for purposes of parade. The company column, corresponding to the German formation of the same name, is used for movements on the battlefield. In both line and company column the platoons are posted abreast, at intervals of three paces. Finally the route column is used. This is formed either by wheeling by squads, or by platoons executing column right (left). On the battlefield the platoon may be deployed and formed in several lines.

In the battalion, company columns in line of columns, or route columns in the battalion column, are posted abreast at intervals of 10 paces. Line and double column are abolished.

Opinions are divided as to the value of the double column. Formerly, when the double column was still the column of attack from which deployment for fire action had to be made, a discussion of its merits was of special importance. While Austria abandoned the double column formation in 1881 and Germany in 1905, Switzerland replaced it by a column having a front of two platoons (*Plotonkolonne*), and Russia readopted it again recently. All other states utilize it as of equal value with the deep column in making movements beyond range of artillery fire and as an assembly formation in addition to the deep column. The change from double column to any company column formation is easier than a like change from the Swiss "Ploton column" (double column of platoons), which has the same front, since in the double column two companies can be deployed at the same time toward both flanks.

The deep column appears to be better adapted for making movements and for advancing under cover, and, on account of its narrow front, a force in this formation is better able to adapt itself to the forms of the ground in hilly or close country than a body of troops in double column of twice the width of front.

The Battalion in Route Column.

(Par. 316 German F. S. R.).

The companies are formed in route column and follow each other at distances of 8 m. Mounted officers, musicians,* led horses and vehicles are to be included in actual depths of columns given and not in the distances. A permanent extension of distances for the purpose of restricting checks of the march to a single organization is as little permissible as the permanent elimination or reduction of distances; distances may be dispensed with temporarily only. The reduction of the depth of a column, obtained by eliminating distances between elements entirely, is so small that the rapidity of deployment gained does not, by any means, compensate for the increased exertion of the troops.†

During the march the company commander goes wherever his presence may be necessary for the proper supervision of his company. Neither are platoon commanders tied to a fixed place; one officer is, however, required to march in rear of the company. The company ammunition wagons follow in rear of their respective companies, or, assembled, in rear of the battalion. In marches in campaign the field train marches separately.

The depth of the battalion on the march, without field train, is 400 m., and the depth of the field train is 100 m.

Austria. Column of fours. Depth of a battalion on the march, including combat train, 670 paces (502 m.). The distance between companies is nine paces (6.7 m.).

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*A trumpeter marches in rear of the battalion for the purpose of blowing "Give way," when necessary to open one side of the road. At this signal all the troops close in toward the flank of the guide.

†The depth of a brigade of six battalions on the march is about 2500 m. By eliminating distances between elements a space of only 100 m. is gained, while by marching in a front of six files, approximately 750 m. is gained. The march of the 10th Infantry Division from Weiszenburg to Preuschdorf, on August 5th, 1870, proved exceedingly fatiguing. The distances between organizations had been eliminated pursuant to orders. "Some of the rearmost elements had to double time uphill to keep up whenever the head of the column went down hill. Great fatigue and many cases of overexertion were the result." *Geschichte des Regiments Nr. 37*, p. 124.

France. The distance between companies is 10 paces (7.5 m.). The depth of each rank is reckoned at 1.40 m. on the march (in Germany 1.10 m.), and that of every 100 men at 50 m. Depth of a battalion, including combat train, on the march is 450 m.

Russia. The distance between companies is 10 paces (7.1 m.). The battalion without combat train has a depth of 350 paces (249 m.). The combat train follows in rear of the regiment.

A German regiment of four battalions with combat train has a depth of 1,650 m. on the march; a Russian regiment, a depth of 1,725 paces (@ 71 cm.)=1,215 m. (elongation on the march not considered).

Italy. The distance between companies is 10 paces (7.5 m.). The battalion has a depth of 422 m. on the march.

8. THE REGIMENT AND THE BRIGADE.

For a discussion of the importance of the regiment and of the brigade see page 37 *supra*. All movements must be executed in an orderly manner by regiment and brigade, in any formation, without breaking up tactical units, and the entity of the whole body must be preserved at the same time by a skillful use of the terrain. If necessary, a base battalion may be designated.

When regiments or brigades are assembled, the formation, disposition, intervals and distances of the tactical units depend upon the terrain and the intentions of the commander. Frequently the tactical units (battalions and regiments) are assembled in separate groups.

When considerations of the enemy and the terrain do not dictate otherwise, the battalions, each, as a rule, in deep column, are posted in one or more lines, at 30-pace intervals and distances, rear battalions covering those in front or the gaps between them. An appropriate formation will frequently be that in which route columns are placed abreast and on the same line.

In the brigade, when assembled or deployed, the regiments may be placed abreast of each other, on the same line, or in rear of each other, *i.e.*, in line or in echelon. When

the regiments are formed side by side, two adjacent independent sections are created, each commanded by a regimental commander; this insures better supervision, better control, and a more energetic conduct of the action, since the first line can be reinforced by troops belonging to the same organization. This formation, moreover, facilitates tactical combinations. It may, however, be a disadvantage that the first line is not subject to the orders of a single commander; that it is difficult to employ the reserve battalions in one body; and that the brigade commander can influence the action only by withdrawing units from the regiments for the purpose of forming a reserve.* The echelon formation, each echelon consisting of a regiment, is frequently used in rencontres, because troops are thrown into action directly from route column. The regimental commanders then become leaders of echelons, the first line cannot be reinforced by its own troops, and the organizations of different regiments finally become mixed. The echelon formation is proper only when the second line is intended to be used independently abreast of the first in the course of the action; for example, on a flank, for the purpose of making or warding off a flank attack.† When part of a larger force, the most suitable combat formation for troops is usually the one in which the regiments are formed side by side.

The disadvantages of the echelon formation, when taken up from route column, can be obviated by deploying the second regiment in rear of a flank of the first. It should be kept intact in that position until the decisive moment, although

*For historical reference as to the importance of the brigade in action, see essay published in *Jahrbücher für Armee und Marine* (August and September numbers 1877) entitled: *Die Infanterie Brigade in ihrer Entwickelung aus der Brigade von 1812.* In regard to the employment of regiments in line or in echelon, see Memoir by General von Moltke on the tactical lessons gained in the campaign of 1866. MOLTKE, *Taktisch-strategische Aufsätze,* p. 99, et seq.

†The fight of François' Brigade at Spicheren. *Gen. St. W.* I, p. 310, et seq. The formation, side by side, of the six battalions of the IIIrd Army Corps in the attack on the hill at Forbach (Spicheren) would have been inappropriate and would have disrupted all organizations.

the state of the fight may, at the outset, invite a more rapid extension of front.

9. EXTENDED ORDER.

Combats are begun and carried out in extended order. The defender can be induced to disclose his dispositions, to occupy his position, and to open fire, only by the advance upon him of a skirmish line. The deployment of a thin firing line will frequently suffice to furnish the commander of the attacking force with a clue to the strength of the force holding the hostile position. In close country, skirmishers are pushed forward primarily to guard against surprise the force which sends them out, but when thrown forward only a few hundred meters in open country, such skirmishers are unable to furnish protection. The strength and density of a firing line (by means of which the fight is sustained) depend upon marksmanship, upon the purpose of the action, and upon the terrain. The poorer the marksmanship or the weapon, or the more unfavorable the field of fire, the greater the number of skirmishers needed (*i. e.*, the denser the firing line).* If the enemy is merely to be kept at a distance, fewer skirmishers (*i. e.*, a thinner firing line furnished with plenty of ammunition) will be required, than if the action is to be carried to a decisive conclusion.

Cohesion and order are best maintained, and the least time is lost in action, if efficient, dense firing lines are led forward as units up to the moment of opening fire. (Pars. 169, 321, 334 and 413 German I. D. R.). But on open terrain such dense firing lines would begin to suffer too great a loss at ranges at which they could not reply to the fire. Nothing remains then but to cover the available front with a very

*The Boers with their superior weapons and better marksmanship, and further because they never cared to become involved in a fight at close quarters, found thin firing lines sufficient.

thin firing line, followed at irregular distances by thin skirmish lines which ploy for the purpose of utilizing cover or for opening fire. Skirmish lines of this description will hardly justify the opponent's expenditure of ammunition, as he can only cover broad spaces with volley fire. On the other hand, these skirmish lines are in themselves too weak to facilitate the approach of the following echelons by their fire. Besides, it must not be overlooked that the soldier, separated by a considerable interval from his comrades in line during the advance, and withdrawn from the influence of his officers, succumbs more easily to temporary spells of weakness and is more apt to remain behind than the skirmisher in a dense firing line. The advance in several successive, thin skirmish lines is therefore only an expedient. In each case the leaders will have to decide whether, in view of the close proximity of the enemy, a united advance with dense, powerful skirmish lines is possible or advisable (for instance, when entering at once upon the decisive stage of the action). Before opening fire the firing lines must be sufficiently reinforced. (Par. 334 German I. D. R.).

This advance in thin skirmish lines stood the test both in the Boer war and in the Russo-Japanese war,* but we must not forget that thin skirmish lines are only maneuver formations in an attack that is to be pushed home, and that the mistake made by the British of attempting to make an attack with such weak skirmish lines should not be imitated. The Japanese also used this formation after they had once opened fire with a dense skirmish line.†

*Four battalions of the 6th Division advanced at Paardeberg on February 18th, 1900, on a front of 2000 m. with 800—1000 rifles, in two lines of equal strength and separated by a distance of 300 m., the remainder following at 400 m. Three battalions of the Highland Brigade even advanced on a front of 4000 m. See my lecture: *Lehren des Burenkrieges. Kriegsgeschichtliche Einzelschriften*, 33, pp. 43 and 67.

For the Japanese procedure see v. LÜTTWITZ, *Angriffsverfahren der Japaner*, pp. 44 and 66. BRONSART VON SCHELLENDORFF, *Sechs Monate beim japanischen Feldheer*, p. 217.

†In regard to the advance of the 6th Reserve Regiment against Husanta-Kantsy at Mukden, on March 5th, 1905, BRONSART VON SCHELLENDORFF (*Angriffsverfahren der Japaner*, p. 225), says: "Some 500—600 m. from the Russian

It might be well to mention here that thin and dense skirmish lines, when under fire, lose an equal number of men in proportion to their strength, provided the front occupied by them is the same.

RESULTS OF A FIRING TEST AGAINST THIN AND DENSE SKIRMISH LINES.

FIRE AT WILL, FREEHAND FROM A PRONE POSITION.

Target.	Range & Elevation: m.	No. of rifles.	No. of shots.	Time min.	Hits.		Figures hit.		Figures missed.
						%		%	
180 head targets placed at intervals of 1-2 paces.	680 Elevation used: first 600 then 700 m.	166	1268	5	54	4	49	27	131
90 head targets placed at intervals of 3-4 paces.	680 Elevation used: first 600 then 700 m.	166	850	5	35	4	27	30	63

The superior effect of fire on the dense skirmish line, as expressed by the greater number of hits, and in consequence thereof, by the gradually growing number of figures hit, is apparent. It is worthy of note and at first glance strange that, presupposing the two lines considered occupy an equal front, the percentage of figures hit is the same. The explanation of this lies in the fact that in correctly distributed fire any specified front space is equally covered with hits so that it is immaterial for the relative proportion of figures hit whether an equal number of figures is removed

position, individual men sprang out of the shelter trench at intervals of 10—25 paces, rushed forward for about 30 m., or perhaps farther, where they threw themselves down and fired. This procedure was repeated until a new skirmish line, with the men approximately 3 paces apart, had been formed about 100—150 m. in front of the trench mentioned. The rest of the men, who until this moment had remained in the trench, now rushed forward in groups of 5—10 men for distances of 30 m., for the purpose of reaching the advanced line."

or added. While, however, the dense skirmish line still has 131 effectives, the weaker line has only 63 left. The casualties are therefore far more perceptible in the smaller force.

(a) The Formation of the Skirmish Line.

Skirmish line with intervals of two paces between the men is formed at the command, "As Skirmishers." (Pars. 142 and 174—180 German I. D. R.). The skirmish line may be deployed from any formation, in any direction, either with or without first changing front. (Par. 177 German I. D. R.). A greater interval than two paces must be specifically ordered. Squad leaders hasten in front of their squads and form the framework of the skirmish line. The men follow their squad leaders absolutely. When the terrain requires it, squad leaders may increase or diminish intervals without command. In other armies (for instance, in those of Italy, France, and England) the desire to keep the skirmishers under control as long as possible, has led to advancing the platoons designated for the firing line at first in close order, the deployment being made only when the state of the action requires it. In France, the intervals between files may be increased, or a single rank line may be formed before the force is deployed as skirmishers. During an advance it will often happen that intervals are increased or diminished in accordance with the peculiarities of the terrain. The advance is continued until the command or signal "Halt" is given. If line of skirmishers is to be formed when marching to the rear, the command is first faced to the front and then deployed on the line then occupied. (Rallying position, par. 180 German I. D. R.). On varied ground, deployments will be made under cover whenever possible in order to allow of an immediate advance in skirmish line from that point. The number of platoons to be

deployed depends upon the tactical situation. When three deployed platoons are formed abreast, it is difficult for the company commander to control them; but this formation is an appropriate one if a company is surprised or enters immediately into decisive action, or in cases where the battalion acting alone requires complete units in reserve for additional tasks. (Pars. 462, 463 and 469 German I. D. R.). When the battalion is engaged as part of a larger force, it is a good plan to occupy all the available front space at once with skirmishers and to maintain the intensity of fire of the firing line by constantly reinforcing it. The losses are less in this case than when the men crowd together in groups. (Italy).

Platoon and squad leaders are posted on the side of their commands facing the enemy while advancing; in moving to the rear, squad leaders are posted on the side away from the enemy, their duty being to maintain the march direction, and the platoon commanders remain in rear of their platoons (*i. e.*, on the side toward the enemy). Russia is the only country where the leaders of a firing line are posted in the rear. In Austria one non-commissioned officer in each platoon is designated to march in rear of the advancing firing line for the purpose of supervising the skirmishers. As this non-commissioned officer is to prevent straggling, he should be selected with great care.

The platoon commander indicates the march direction to the leader of the base squad, and, accompanied by the range finders and the musicians, moves to a point at least ten paces in front of the line of his squad leaders, as a rule, opposite the center of his platoon; but he is not restricted to this position. He must possess mobility if he desires to lead his platoon skillfully on varied ground, if he expects to avoid interfering with neighboring platoons, and if he wishes to observe the enemy at the same time. The musician keeps the company commander constantly in view. (Par. 221

German I. D. R.). The range finders observe the battlefield, estimate the range to any targets appearing in view, without being specifically told to do so, communicate the range found to the platoon commander (this should not be done by shouting, as misunderstandings might result therefrom), and observe the effect of the fire. (Par. 173 German I. D. R.).

Whenever the flanks of a skirmish line are not protected by other troops or by natural obstacles, a few men under a prudent leader should always be sent out as combat patrols to the flank, or better still, to the right or left front. The patrol should under no circumstances lose connection with the command which it is to protect, but, on the other hand, should not stick so close to it that the file on the exposed flank is in a position to see as much as the combat patrol itself. As a report from a combat patrol frequently arrives too late, or cannot be made at all on account of hostile fire, signals should be agreed upon and the leader of the squad on the exposed flank of the line should keep the combat patrol constantly in view. Signal flags may also be employed advantageously in such cases.

The **Austrian** deployment is similar to the German, the intervals between skirmishers being about two paces. In **Italy** the skirmishers are posted at intervals of 1.5 m. (*catena ordinaria*), but this interval may be increased by order up to three paces (*catena rada*). The interval between squads in extended order is 4—5 paces to facilitate volley fire by squad. The **French** deployment is similar to the German. An intermediate extended order formation is that in which an advance is made in line, the files at extended intervals. In **England** skirmishers are placed at intervals of 5—15 paces during the initial deployment. At short ranges where the decision is sought, one rifle per 2—3 yards of front (1.8—2.7 m.) is the rule, one rifle per yard of front (0.90 m.) being the maximum. In **Russia** and **Japan** the intervals are as ordered. In **Switzerland** skirmishers are posted at intervals of 1—2 paces; when a greater front is to be covered the intervals between squads are increased. The length of the rushes depends on the ground, the effect of fire, and the endurance of the men. In exceptional cases an advance by rushes, by squads or single men, is authorized.

(b) Movements in Skirmish Line.

Fire action requires steady breathing, and, on this account, all movements to the position at which the fire fight is to be taken up, should be made, as long as possible, in a free swinging stride. A careful observation of alignment or of intervals cannot be insisted upon. Cover found within the allotted front should be utilized by ploying, but this must neither interfere with the harmonious advance of the entire force nor cause a loss of the march direction. Considerations of cover for individual men should not interfere with the spontaneous progress of the movement. Orderly movements in long skirmish lines are best made by designating a certain element as the *base,* whose leader is far in advance of it; all neighboring leaders maintain their intervals from, and endeavor to remain approximately on line with him. This has the advantage of relieving the commander of the whole line from looking after these details and leaves him free to concentrate all his attention on the enemy. Minor changes of the march direction are executed by inclining to the right or left or by designating a new objective. More extended movements by the flank, within range of hostile fire, are possible only under cover. Changes of direction are executed like a gradual front into line, in which a temporary echeloning of the elements, or one which can be adjusted by degrees, is unavoidable. (Par. 185 German I. D. R.).

In the absence of cover, an advance in quick time will be possible only at long ranges unless the hostile fire can be kept down by fire from enfilading or commanding positions. Skirmish lines advancing without fire support over ground devoid of cover, begin to suffer appreciable losses at 1000 m. The more effective the hostile fire, the more pressing the necessity of diminishing, as far as this is possible, the periods of time during which the skirmishers present their whole

bodies as targets to the enemy. This leads in itself* to an **advance by rushes,** since the whole distance separating the advancing line from the enemy cannot be covered in one rush. Double time may be employed by a skirmish line when it becomes necessary to reinforce an advancing firing line quickly, to forestall the enemy in reaching a certain point, or in moving under fire, from the covered fire position occupied, to another position. It is impossible to prescribe definitely and for all cases at what ranges the advance by rushes should be taken up and when fire should be opened in advancing by rushes, since it depends upon the intensity of the hostile fire.

The assailant will, in the first place, endeavor to advance without firing, in order to reach those ranges quickly at which his fire will begin to be effective against the well-covered targets of the defender. The skirmishers advance in strong detachments, by rushes of the greatest possible length, taking short breathing spells at each halt. Very soon, however, the hostile fire makes this advance impossible. A fire fight of variable duration must first make a further advance possible by silencing the fire of the defender. In a serious infantry engagement every step forward must be purchased by the fire of the attacking infantry. The attacker will, in exceptional cases only, continue his advance in long lines, although this must appear desirable to him, for almost invariably only a part of his force will still be able to gain ground to the front when supported by the fire of neighboring detachments. Favorable local conditions, insignificant losses, and, above all, the personality of the commander will embue a force with the determination to advance.

*KUNZ, *Kriegsgeschichtliche Beispiele,* 14, pp. 40, 48 and 77.

Time Required for Making a Rush. Strength of the Force Making the Rush.

The squad requires 5—6, the platoon at war strength about 10—15 seconds preparation for making a rush.

To cover 80 m., requires 26—30 seconds;
" " 40 " " 17—20 "
" " 25 " " 10—15 "

While the attacker covers a distance of 80 m., the defender, if in readiness, can fire 4—5 shots. This proves very clearly that, in order to be able to make such a rush, a certain superiority of fire is absolutely essential. These figures change radically as soon as the troops are seriously engaged with the enemy and come under his fire at short ranges. At short ranges, aside from the size of the target offered, attempts to advance by rushes with entire companies must very soon cease of their own accord.

The character of the terrain and the fire of the enemy play a decisive role here.

The strength of the force making the rush is intimately connected with the length of the rushes. A small, isolated force would run the risk of being fired on by its own neighboring detachments. Besides, confidence and moral courage are difficult to find in a small force. It is difficult to carry forward long lines as units. The use of long lines necessitates, as a rule, an almost complete cessation of fire, and, in addition, mutual fire support suffers. Long lines should therefore be employed only when the attacker possesses a very marked superiority of fire. In practice it has been found advantageous to make the rush with the smallest fraction led by an officer, i. e., with a platoon.

The following appropriate statement appears in *Taktische Rückblicke auf* 1866: "In the danger zone which suddenly surrounds and startles him in war, the soldier feels, in the first place, a desire to have someone

assure him that the seemingly critical situation in which he finds himself, is as it should be. His eye is naturally directed upon his officers. If the officer's quiet glance reminds him that here, as in peace time, the first duty is obedience, and if he sees the officer subsequently advance fearlessly and vigorously, he will, as a rule, not worry about the why and wherefor. It is this faithful attachment to the person of his officer, rather than ambition and patriotism, which inspires the soldier to highest efforts. Those who suppose that all our soldiers are heroes simply because they are products of a courageous race, are very much mistaken. This would indeed be an invincible army, requiring no tactical advice, if its soldiers would do nothing in action but their simple duty voluntarily."

The severest test of discipline is for a skirmish line to rise and rush forward under an effective hostile fire. This movement had best be executed with precision and energy even during peace exercises. The formation and manner of execution must become second nature to the soldier, like a movement of the manual of arms, which he retains during his entire military service, and a knowledge of which he brings with him when called to the colors during mobilization. The example set by advancing leaders and the arrival of reinforcements, which move forward through the firing line, have been found to be the most effective means of carrying a skirmish line forward.

The critical moment occurs when the men rise and prepare to rush forward, for an unsubdued enemy will be desirous to prevent, by increasing his fire, any attempt to advance. The fire support afforded by neighboring detachments would seem to have a conditional value only; for, being themselves under fire, the skirmishers of these detachments cannot be expected to divert their fire from the opponent previously fired upon, to an enemy by whom they themselves are not threatened. In oblique fire, the rifles, on account of their short barrel, interfere with neighboring ones, and, in addition, expose the men advancing on the flanks to the danger of being hit by the fire of their comrades. The fire support is, therefore, restricted to hindering the hostile skirmishers directly opposite from firing on the advancing

unit. When the terrain is favorable, infantry and machine guns should not hesitate to fire over the heads of their own skirmishers. The coöperation of artillery will, in any case, be of great value, and infantry will have to select those moments for advancing when the defender is driven under cover by the hail of shot.

The advance by rushes, consuming time and energy, is an expedient to which the enemy compels us to resort as the only means of gaining ground to the front. The firm determination to close with the enemy and the ever-increasing difficulty of inducing the men to advance from cover, require that long rushes be made. Short rushes are neither consonant with the nature of the attack, nor with the desire to close with the enemy. "Many halts during an advance are fatal to the offensive." (HÖNIG). The powers of endurance of the men, the character of the ground, and the hostile fire, as well as the support afforded by infantry and artillery fire, influence the length of the rush. If the leader has already caused the skirmishers to rise, it is best to let them run forward so long as the physical powers of the men and the hostile fire permit. The only danger is that the men will throw themselves down prematurely, and without orders. It is rather an advantage that during the rapid advance, increasing both muscular and nervous activity, the men do not think of danger and have no time to pay attention to their fallen comrades. One fact is, however, worthy of special attention: If we train a soldier to make long rushes in time of peace, he will be able to make them in time of war, and it is easier for a leader to decrease than to increase the length of rushes in the field.

The short rushes are considered advantageous because they take the enemy by surprise, in consequence of which he is not in a condition to direct his fire on the advancing unit. Rushes should be made with startling suddenness. They should

not be made in step at double time, but, on the contrary, as rapidly as possible (by rushing); by the time the enemy directs his fire on them, the skirmishers should already have thrown themselves down. Stragglers should also throw themselves down, when the men in the lead drop down behind cover, and should then endeavor to reach the firing line by crawling.

The enemy will concentrate his fire on the unit which advanced first. The fire of this unit will at the start be rather weak, getting stronger gradually. If this unit is left in its advanced position for some time there is danger of its being thrown back; all neighboring units must therefore endeavor to rejoin it as soon as possible.

The greater the superiority of our fire, i.e., the marksmanship which compels the enemy to keep under cover, the greater the length of the rushes and the rapidity with which they follow upon each other.

Short rushes with small units occur quite naturally, because the platoon leader no longer succeeds in inducing his whole platoon to rise, since his influence extends only to the men nearest him, and because the flank squads at first remain behind and only gradually try to rejoin the leading skirmishers. If only a part of the skirmishers have jumped up, it is quite natural for them not to make a long rush, but to throw themselves down before reaching the new position, because of the feeling that they have been abandoned by their comrades and the fear of running into their field of fire. Thus, in spite of the best intentions of the leader, the short rush by small units occurs. In time of peace, however, we should retain the long rush by platoons and not endeavor to give human weaknesses the force of regulations.

When once compelled to employ short rushes the following question presents itself: Is the advantage of such a small gain of ground worth the trouble of inducing the soldier to rise for making an advance by rushes? Would it, therefore, not be more profitable to **crawl forward?** A man

crawling on his belly presents a vulnerable surface of approximately the size of a breast plate 50 cm. high. In an advance made by a large unit, or over covered terrain (fields of standing grain) crawling would be difficult (difficulty of maintaining the direction of march and reduction of the rate of advance); it would also be difficult to get men to advance to the charge after they have crawled along in this fashion for some time. The supervision of a unit crawling forward would also be exceedingly difficult. The following results were obtained in experiments made under favorable conditions: A distance of 500 m. was covered by crawling in about 10 minutes; crawling tired the men, increased the activity of the lungs to such an extent that deliberate aiming and firing was out of the question and the motion produced a noticeable swelling of arms, hands and knees.* The Boers occasionally used the following method: One man crept forward once or twice his own length, raising his body slightly, while the man next to him fired; then they exchanged roles and this procedure was repeated uninterruptedly. In any case, troops ought to be able to execute both the advance by rushes and the advance by crawling with or without firing. On terrain devoid of cover a skirmish line will frequently be able to advance only by crawling.

Procedure: The man throws himself on the ground at full length, head resting upon the bent left arm, right hand grasping the small of the rifle-stock. The man moves forward by alternately bending and straightening the right leg. When the right leg is straightened the body slides forward without rising in the least from the ground, and the head also remains in position resting on the left arm. The head is raised only when the man fires his piece, the butt of which is placed against the shoulder. Crawling on all fours is very tiring, the man offers a larger target, and, in addition, is not immediately ready for firing.

In this manner the Boers succeeded in shooting the enemy out of his position. The firing line, while keeping up an incessant fire, slowly but steadily advanced. The advance of this uncanny crawling line is said

*During the engagement at Paardeberg (18th February, 1900), the fighting line of the British 9th Infantry Division was reinforced by troops crawling up into the line, and carried forward to within 450 m. of the enemy's position. An isolated assault was subsequently repulsed by the Boers.

to have produced an especially disquieting and paralyzing impression on the immovable defender, who was tied to his position, because of his inability to inflict perceptible losses on these small, prone targets, and because, moreover, he himself was continually under a galling fire. As no assault was made, no opportunity was offered the defender for using his rifles against targets the height of a man. The British infantrymen were, however, insufficiently trained in handling their weapons independently. As to rise and to retreat meant annihilation, the determination to resist weakened gradually during the long fire fight, and, in order to escape from this seemingly unendurable situation, which grew more and more acute with every minute, and which paralyzed every energetic decision, one avenue of escape only seemed open, that of surrender. *

One who fought on the Boer side writes as follows: "After we had crept up, in this manner, constantly firing and crawling, to within about 300 m. of the enemy, we saw many white handkerchiefs waving over in his lines, as a signal of surrender. As we placed little credence in these signs of surrender, however, on account of many a bad experience, we continued the advance by crawling. But, as soon as we saw that most of the men in the enemy's ranks were throwing away their weapons, we rose to make the British prisoners. When we came up with them, I noticed that a great many of the men were weeping like children. Later, when I voiced my astonishment over the morale of their troops to some English officers, they stated that it was due to the uncanny manner of our advance.

"These officers stated, moreover, that the sight of danger approaching ever closer without their being able to ward it off effectively, caused great depression and alarm among their troops; for the Boers, utilizing every available rock in crawling over the plain, presented such an unfavorable target that the British fire had had very little effect, while they themselves had been constantly exposed to the Boer fire. All this, they claimed, had contributed to unnerve their troops." †

Lessons of the Boer War: "The rushes * * * were of variable length, according to the intensity of the hostile fire; they varied from 30 to 80 m. According to the opinion of many British officers it was exceedingly difficult to induce skirmishers to rise and rush forward under hostile fire; but that once upon their feet, it became necessary to

*Engagement at Nicholson's Neck, October 29th, 1900. *Vierteljahrshefte*, 1905, pp. 145 and 149.

†*Supplement No. 8 to Militär-Wochenblatt*, 1900. *Spionskop*, in *Kriegsgeschichtliche Einzelschriften*, 34/35, p. 59.

push the attack forward as far as possible regardless of the increased losses entailed by the longer rushes."*

One who fought on the Boer side reports as follows in regard to the British advance by rushes: "The men rose gradually and hesitatingly. This gave the attentively watching enemy time to pour a well directed fire upon the last men who arose. Thus even short rushes made by long lines became generally too costly to be executed. Smaller groups, on the other hand, were able to move with startling rapidity. * * * Every sudden interruption of the firing that might attract the enemy's attention should therefore be carefully avoided, but, as a rule, this is possible only when the advancing units are small."

The British Regulations of 1896 prescribe rushes of 30—40 m., and those published immediately after the war (1902) prescribe rushes of 70—90 m., but the rush is to continue only while the surprise of the enemy lasts.

Russo-Japanese War.

In the Japanese army, the 5th Infantry Division employed short, and very short, rushes by preference, while other divisions of the Ist Army as a rule preferred long rushes. From an English work we obtain the following data in regard to the length of rushes and the expenditure of ammunition per rifle during halts between consecutive rushes in the engagement on the Shiliho on October 12th, 1904, at ranges beginning with 1,000 m.

From the table it appears that after gaining the superiority of fire, beginning with the fifth rush, at about 625 m. from the enemy, the length of the rushes increased; the last 400 m. were covered in one rush as the enemy withdrew from his position.

*Kriegsgeschichtliche Einzelschriften, 33, p. 69.

1st	rush.....	132	m.,	about	30	rounds	of	ammunition	per	rifle
2nd	"	58	"	"	15	"	"	"	"	"
3rd	"	63	"	"	15	"	"	"	"	"
4th	"	61	"	"	15	"	"	"	"	"
5th	"	75	"	"	15	"	"	"	"	"
6th	"	151	"	"	5	"	"	"	"	"
7th	"	400	"							

940 m., about 95 rounds of ammunition per rifle

If we assume that three shots per minute were fired from each rifle, it follows that the attack consumed approximately 40—45 minutes.

Provisions of the Various Regulations Relative to the Advance by Rushes.

Germany. (Pars. 188, 189 and 337 I. D. R.). To advance by rushes, the following commands are given: (Such) **Platoon (section, squad) Rush!....Rise!....March! March!** At the command **Rush!** the skirmishers finish loading, lock pieces, close cartridge boxes, and prepare to rise. Skirmishers lying prone take the piece in the left hand, lean on the right, and draw the right knee as close to the body as possible without thereby raising the body from the ground. After a brief pause, during which these preparations are made, the platoon commander jumps up and at the same time commands: **Rise!....March! March!** At this command the skirmishers jump up and rush forward. The length of the rush will rarely exceed 80 m. (Par. 337 German I. D. R.). While rushes should, as a rule, be as long as possible, short rushes, which are designed to leave the enemy no time for firing, should also be practiced. The principal thing is that skirmishers rise promptly and simultaneously and that they rush forward rapidly. The rush is terminated by the command *"Position"*; the sight setting is changed when necessary and fire opened without further preliminaries. Frequently the new firing position may be indicated before the rush is made.

Austria. Rushes are as a rule made by platoons. "The length of the rushes depends upon the character of the ground and the tactical situation, as well as upon the physical condition of the men. They serve as an expedient for reaching the next firing position."

France. Rushes are made, without fixed rules, from cover to cover (*par bonds successifs*).

England. (Regulations dated 1896): Originally the regulations prescribed rushes 30—40 m. long, but, as a matter of fact, their length was actually increased to 60 and 100 m. during the first engagements of the South African war, in cases where the fire of the enemy was not especially heavy. The regulations of 1905, recently published, state: "Rushes over open ground should not exceed 80—100 yards (i. e., 70—90 m.) and will, in fact, rarely reach this length. At decisive ranges, i. e., under 540 m., they should be short enough to afford the enemy no opportunity to pour a well-directed fire on the skirmishers. When cover is available the advance is made from cover to cover." At another place the regulations state: "On open ground and within effective range, long lines of skirmishers, rising simultaneously, will suffer heavy losses even when making short rushes; the sudden movement of smaller units may take the enemy unawares, so that for a time at least well aimed fire is avoided. The rush is continued only while the surprise of the enemy lasts. The shorter the range, the smaller the advancing units will have to be, and the shorter the length of the rushes."

All preparations for a rush must be made as unostentatiously as possible. The units following in rear should, whenever possible, advance beyond the leading unit which is lying down and firing. When an advance by rushes in units is impossible, individuals may run or crawl forward.

Italy. Long rushes, at least with platoons, otherwise with companies, are used as a rule, so long as the hostile fire permits. When the intensity of the hostile fire increases, or after the organizations have become mixed, rushes can no longer be made by entire units but only by squads or like fractions. These leave the main line and endeavor to reach the next cover at a rapid run, or if cover be lacking, throw themselves down in order to open fire again at the shorter range thus gained. As a rule, the leading echelons open fire at once from their new positions so as to facilitate the advance of the others, unless special circumstances make it advisable to delay the firing until all the other units have reached a good position and are able to direct an effective fire upon the enemy.

Japan. Rushes are made according to German pattern, their maximum length being 100, their minimum 30—40 m. Rushes are not made by units smaller than a platoon.

Russia. Rushes are made by individual men, by groups, by sections, and by platoons. The length of the rushes is not indicated. When sections advance by rushes the platoon commander indicates the section which is to advance first, and also the order in which the others are to follow. The Russian regulations are the only ones which prescribe a "movement to the rear by rushes," at a run.

Frequently, when the men are very much fatigued, when advancing over plowed ground and through extensive grain fields, an advance by rushes will be impossible. Whether

fire while in motion ought to be employed in this case should be determined. A preliminary condition for its employment is, however, that the enemy's fire has been subdued or that he has been forced under cover. To advance against an unshaken enemy with fire while in motion must lead to the annihilation of the attacking force. While the defender scores only 12.8% hits against advancing skirmishers at 700 m., the attacker scores only 1.6% to 3.5% hits against head and breast targets. With such a discrepancy in fire effect, the attack, if employing fire while in motion, is bound to collapse, unless it has already gained a superiority of fire prior to the advance. It is unfortunate that fire while in motion is frequently employed when inappropriate during drills. The danger of men wounding each other and of the advance hesitating because the officers are not in front of the line is not to be underestimated. On the other hand, the advantages of eliminating the difficulties of inducing the men to rise, of the troops leaving their losses behind, of stragglers being more easily detected, and of keeping the entire hostile line under fire, cannot be denied. In war this method of advance will frequently result without orders while advancing to the charge after the defender has been driven under cover. (In Russia this mode of advance is prescribed).

During experiments in field firing, held in Austria by a force advancing from 1,400 to 600 paces, with an expenditure of an equal number of rounds of ammunition in each experiment, the following results were obtained:

Regulation attack:	Fire while in motion:
Time.....26 min. 28 seconds	18 min. 40 seconds
Fire pauses.....12 " 18 "	7 " 40 "

Attacker against the defender:

Percentage of hits....7 ..... 16.7

Defender against the attacker:

Percentage of hits....9.2 ..... 33.

Percentage of hits obtained during the execution of the attack from 1,400 to 100 paces:

Attacker.....22.7 ..... 20.

Defender.....32.2 ..... 51.2

There is no model advance within the zone of effective infantry fire. All expedients, whether they be sneaking or crawling, long or short rushes, or fire while in motion, are of equal value, if the force, kept well in hand by the leader, is thereby brought closer to the enemy. Every opportunity to gain a foot of ground to the front, offered by flanking fire or fire directed at the enemy over the heads of the advancing force, must be utilized. The effect of our own artillery fire should also be attentively followed with a view to advancing when the hostile skirmishers have sought refuge under cover to escape our shrapnel.

Examples of the Employment of Fire While in Motion.

The successful attack made by the 1st Turco Regiment at **Wörth.***

This attack was made against disordered and exhausted troops which lacked officers and reserves. The attack was finally repulsed by Prussian artillery and the IInd Battalion of the 58th Infantry.

The attempted sortie of the Turks on December 10th, 1877.†

The attack, made in superior force and supported by artillery, was successful in that the Russian intrenchments and rifle pits were taken. With the arrival of Russian reinforcements, which advanced against front and flank of the Turks, the situation was reversed.

The attack made by Vinoy's Corps on September 30th, 1870, against the VIth Army Corps in **l'Hay** and **Chevilly:** "The defender's coolness and confidence in victory grew with this ineffective fire of the attack, and finally the dead were piled up in heaps by the steady volleys delivered by him at short ranges (300—400 paces).‡

Examples of the Employment of Rushes.

1. Attack on **Le Bourget,** on October 30th, 1870.¶

Two battalions of the *Kaiser Frans* Guard Grenadier Regiment had to advance from Dugny against the enemy in the northwest edge of Le Bourget over 1,500 m. of very open terrain, covered only with high potato

*v. BOGUSLAWSKI, *Geschichte des Regiments Nr. 50*, p. 212.

‡Springer, VI, p. 204.

†v. SCHLICHTING, *Taktische und strategische Grundsätze*, 1, p. 71.

¶HOHENLOHE, *Briefe über Infanterie*, p. 80.
KUNZ, *Kriegsgeschichtliche Beispiele*, 10, p. 43.

crops. The battalions were formed in two lines with two companies entirely deployed in the first line, and the battalion reserves in rear of the center of the line with files at extended intervals. The second line was formed similarly. The two companies in the firing line advanced at first without firing, by rushes of about 300 m. each, made by alternate companies, each moving forward beyond the point where the other had halted. When effective range was reached one company opened rapid fire while the other moved forward by long rushes. The companies in rear followed in a similar manner. The tall potato bushes partly concealed the lines while lying down. In this manner the two battalions reached the outskirts of the village almost without being checked, the defender having withdrawn to the interior of the village.

The losses of the two battalions, while advancing by rushes, were insignificant.

The regimental commander, bearing in mind the lessons gained at St Privat, had drilled the regiment beforehand in this mode of attack.

2. Attack on Redout No. 2, at **Scheinovo,** on January 9th, 1878.

The attack by Skobeleff's Division, consisting of four battalions (*Drushines*) of Bulgarians, and the *Ugla, Vladimir,* and *Kasan* Regiments, was to be made under cover of the fire of two rifle battalions armed with Berdan rifles, and of a provisional battalion of the *Ugla* Regiment armed with captured Turkish rifles. The only artillery available consisted of a mountain battery, while the Turks were able to bring twenty guns into action.

The Turkish rifle fire began at about 1,000—1,200 m., but the Russian firing lines continued the advance with shouldered arms. Only when the losses increased noticeably did they advance by rushes, *without firing,* from 750 to about 500 m. where they opened fire. The rushes were made by the entire firing line; the supports, with files at extended intervals, did not follow until the firing line had thrown itself down.

After the firing had lasted for some time, the Ugla Regiment, from the reserve, was formed in three lines, each consisting of one battalion, each battalion again into two lines with 350 m. distance between lines (total depth of the column about 1,800 m.). From 900 m. on, the advance was made by rushes, the entire force inclining to the right front. While covered by the fire of the skirmishers of the firing line in front, the length of the rushes was 100—150 m. At 250 m. from the enemy, the leading line, extending the line of the Bulgarian and Rifle Battalions, was able to open fire and, after about thirty minutes, when it was clearly apparent that the Turks were evacuating the work, the regiment began the assault, which was successful.

Of the troops in the first line, the 11th Rifle Battalion lost 11 officers and 422 men; the 9th Rifle Battalion, 5 officers and 269 men; the original strength of each being about 800 men. Expenditure of ammunition: 11th Rifle Battalion, 120 rounds per rifle.

The Ugla Regiment, which advanced in close order after the defender's fire had been silenced, lost only nine officers and 391 men. The Kasan Regiment, which followed the Ugla Regiment, participated in the assault on the second Turkish position. The Turkish fire had abated to such an extent that the battalions were able to advance in rear of one another, each in two lines with distances of only 35 m. between lines; the intervals between companies were 15 m., and those between files were extended. Losses: four officers and 76 men. Expenditure of ammunition: 12 rounds per rifle. *

In contrast with these examples of long rushes, almost every obstinate engagement with an unshaken enemy showed that "every step forward" had to be literally gained by the impulse imparted by the arrival of small, fresh detachments, that the rushes often faltered after only 20—30 paces, and that frequently nothing remained but to work forward individually. (See pp. 76 and 87 *supra.*)

The frontal attacks made at **Wörth,** at the Roten Berg at **Spicheren,** opposite **Flavigny,** on August 16th, 1870, and opposite the gravel pits of **Point du Jour,** on August 18th, 1870, etc.

In the Russo-Turkish war, the engagement at the mills north of **Lovtcha,** the fight for the possession of the Green Hill ridges south of **Plevna,** and the fight during the advance from the west and southwest against the large work of **Gorni Dubniac,** show how rushes, repeatedly attempted at short ranges, faltered after only a few paces. "On a signal given by Ljapunov, which was to be repeated by all the officers, the men were to rush forward immediately. Just before the movement began, the Turks opened the usual incessant fire, and the simultaneous advance of so many squads was of course absolutely impossible. The rushes were, therefore, always made by groups of 2—3 men. These groups would rise, one in this company, one in that, run forward a few steps, and then throw themselves down again."†

The attacks on **Railway Hill** and on **Hart's Hill** (February 1900), on the **Tugela,** show an endeavor to advance at first by long rushes, then by rushes gradually diminishing in length, the infantry finally working itself forward by twos and threes for the purpose of reaching the last firing position from which the final assault could be made.‡

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*KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg,* III, pp. 168—186.

†PUSYREWSKI, *Die russische Garde im Kriege, 1877-78,* p. 127.

‡*Kriegsgeschichtliche Einzelschriften,* 34/35, pp. 129, 139. *The Times History of the War in South Africa,* III, p. 539.

(c) Reinforcing the Firing Line.

If the fire power of the firing line is to be maintained after heavy losses, or the intensity of its fire is to be augmented, or when it finally is to receive the impulse for making a further advance, it must be reinforced. (Pars. 226, 227 and 341 German I. D. R.). This may be done by prolonging the line (platoons abreast at well defined intervals), or, when space is lacking and after losses have occurred, by putting men in the intervals (*i.e.*, increasing the density of the line and filling it up). When the firing line is prolonged, tactical units are not broken up, and this facilitates fire control. Whenever practicable, the firing line should be reinforced by prolonging it, although the other method, that of placing men in the intervals and gaps of the firing line, is more frequently used and more practical because the arrival of fresh men and the replacement of incapacitated officers occasioned thereby renews the strength of the firing line (replenishment of ammunition). The breaking up of platoons is unavoidable, and on that account platoon and squad leaders should be trained in time of peace to form new units at once so that control is not lost. In order to prevent the mixing of units, so far as this is possible, and to keep the firing line filled up with skirmishers, even during an engagement entailing heavy losses, it is indispensable that the fighting front should be limited, that of a company in attack to 150, in defense to about 200 m. The unit designated to reinforce the firing line endeavors to approach that line under cover, forms skirmish line at any rate before leaving the last cover and advances by rushes, or, if directly in rear of the firing line and under a heavy fire, even by crawling.

Austria. Both modes of reinforcing the firing line, that of prolonging it, and that of filling the intervals and gaps, are used. When prolonging the line the reinforcement may remain abreast of the firing line. During an attack efforts should, however, be made to advance beyond the firing line—"to overreach it." The other method, that of filling up the line, is

in attack, as a rule, to be used for the purpose of carrying the line forward, the rush to be made as soon as the reinforcement reaches the firing line. Signals are prescribed for prolonging the line without advancing beyond it, for reinforcing that line and advancing beyond it, and for filling it up and carrying it forward in a rush.

(d) Closing Up. Assembling. Re-Forming.

(Pars. 211—214 and 230—232 German I. D. R.).

The most effective method of preventing a mixing of organizations in action is for all units constantly to endeavor to close in toward their leaders, filling gaps as soon as casualties have occurred. Squads which have sustained heavy losses unite with adjoining ones under a common leader. This closing in can, as a rule, be executed only while in motion. It must be effected gradually and the intervals ordered should be maintained. Crowding of every description increases losses and causes dangerous gaps along the entire front.

If in the course of an engagement, the purpose of the action and the situation make it no longer desirable to retain an extended order formation, each leader, from the squad leader upward, must assemble his unit at once and place himself and it at the disposal of the commander of the next higher unit. Formed bodies must be created quickly and held well in hand by their leaders, without awaiting specific orders to that effect.

The troops must be assembled very quietly and always facing the enemy.

The original organizations are not re-formed until the command "Fall in" is given. (Pars. 214 and 232 German I. D. R.).

10. SUPPORTS.

(Pars. 222—228 and 341 German I. D. R.).

The limited front assigned to an organization necessitates, in the first place, a division into firing line and retained fractions. At the decisive stage of a fight every available man must, without question, be in the first line.

Italy. Supports are not to be used when they cannot be maintained at a less distance from the firing line than that separating the latter from the enemy.

It is the duty of supports to reinforce and extend the firing line, to cover the flanks (par. 222 German I. D. R.), to act as a reserve, and, in case of necessity, as a rallying force upon which the firing line can fall back. The presence of supports increases confidence in attack, and the power of resistance in defense. Supports enable a leader to influence the action, to give a firing line that has been checked the impetus necessary to carry it forward, and to affect the action by sending reinforcements to points where he wishes to gain an advantage. The support follows that part of the firing line which, in all probability, will need its assistance; if part of the same organization as the firing line, it follows in rear of the center, otherwise in rear of a wing. In a company advancing alone over covered terrain, it will sometimes be necessary to place small supports in rear of both flanks. Firing lines can perhaps advance for some time under hostile fire, whether they move by twos, by squads, or by platoons, but the power necessary for pushing home the attack must be imparted to them from the rear; otherwise the energy of the attack will spend itself. The necessity of having supports in rear of the firing line is clearly illustrated in the very instructive engagement at Wagon Hill in front of Ladysmith (6th January 1900). In this fight all attempts to push the firing line forward failed, and the neces-

sary impetus for the decisive advance was not given until fresh supports were fed into the firing line.*

In hilly country the supports can fire over the heads of the skirmishers in front of them without neglecting their proper functions. (Switzerland and England). Such opportunities should not be overlooked, as they increase the volume of fire.

Distances depend upon the object to be attained by the action and upon the terrain.

When a decision is sought, distances should be decreased in the course of the action. When this is the case, the leaders of all grades should be animated by but one desire, that of being in front in order to participate in gaining the victory. The duration of the crisis of an action is usually brief, and in a very few rapidly passing moments the leader must decide what to do with the troops remaining available.

When an immediate decision is not sought, it is advisable to increase distances in order to keep the echelons held back in rear from coming under fire. In any case, the distance between supports and firing line should be less than the distance between firing line and enemy. In an attack, supports should be close enough to the firing line to prevent, by timely interference, a retrograde movement of the latter. On the defensive, on account of the difficulty of bringing up supports for the purpose of repulsing an assault, they will usually be placed a short distance immediately in rear of or within the firing line (intrenched) at the points where they are to be employed.

During an attack, whenever the lines in rear cannot be kept out of hostile fire, care must nevertheless be taken that two echelons be not simultaneously struck by a cone of infantry fire or by one and the same shrapnel. The distance between echelons is therefore increased to more than 300

*The Times History of the War in South Africa, III, p. 200.

m., and should not be reduced until the decisive stage of the combat approaches.

In open country, supports held too close to the firing line will soon cease to exist as such. When kept in close order, their losses would be so great that the boldest men would join the firing line and the less courageous would hunt cover. Everything depends upon the manner in which supports are led forward, especially during that part of the advance immediately preceding their junction with the firing line. In this lies the whole art of fighting in deep formations. Covered terrain permits distances to be reduced. The commander should be particularly careful not to let this advantage escape him, since on such terrain it is more frequently necessary promptly to reinforce the firing line.

The commander of the support must constantly observe the movements and successes of the firing line in order that he may be able to reinforce it in the most advantageous manner. Whenever he is obliged to split up his command during a movement to the front, he should endeavor to reunite it at the first opportunity.

The support should closely adapt its movements to those of the firing line. When a part of the firing line makes a rush, the support halts for the moment, and then runs forward to the next cover, simultaneously with the next advancing unit of the firing line, and covered by the fire of the skirmishers in front. "To make a rush at the same time as the firing line was impossible, because, as soon as the latter rose, the Turks opened a murderous fire. Whenever the firing line threw itself down and returned the fire, that of the enemy became noticeably weaker."*

The supports follow the firing line in single or double rank, in column of twos or squads, in skirmish line or in line of squads, in quick time or by rushes; it may also be advisable to deviate temporarily from the direction of ad-

*Report of Lieutenant Borsov, in KUROPATKIN-KRAHMER, Kritische Rückblicke auf den Russisch-Türkischen Krieg, III, p. 183.

vance. Columns having a narrow front, so long as they are not open to attack from a flank, are able to withstand long range infantry fire. (Par. 224 German I. D. R.). On coming to a halt, it is advisable to return to close order formation; at any rate, the leader must get his command again entirely under control.

Supports in Rear of the Firing Line or Not?

Up to a few years ago (1894), the French battalion was divided into firing line and companies of the second line. The Japanese, also, often placed entire companies in the firing line, which could not be quickly enough reinforced by the companies of the second line, because these were held too far in rear. At any rate, supports are of advantage during the first deployment before the situation is clear.

The following arguments are advanced against the employment of supports:

1. *The supports following the firing line suffer losses, without, as a rule, being able to participate in the action.* This argument is not well founded, since the criticism made with reference to supports is equally applicable to companies in the second line. That supports threw themselves into the firing line in the Franco-German war, in the belief that they were needlessly suffering losses, was due to the fact that they followed the firing line too closely.

Supports following the firing line closely (250—300 m.) can reach the firing line quickly and can easily find cover on account of the small angle of fall of modern bullets. Besides, the knowledge that supports are immediately in rear, the moral factor, should not be underestimated.

2. *The supports may be commanded by inexperienced leaders, who will not always act with the good judgment the situation demands and will fail to seize the right moment for advancing.* (This can perhaps never be avoided).

3. *Pushing the supports into the firing line tends to mix units, makes control more difficult, and impairs the efficacy of fire.* These criticisms are not applicable to a company, for it is in any case impossible for the company commander to control the fire; this is the business of platoon commanders.

The advantages of supports are, that they increase the number of targets offered the hostile artillery; that, by reason of their small size, they can utilize every accident of the ground; that they can be kept close enough to the firing line to reinforce it in case of sudden emergency; and that they allow companies in the second line to be kept farther to the rear. A battalion, when part of a larger force, need not keep formed bodies as supports; but a few platoons, following the firing line in close order on the flanks, are an advantage. The drawbacks of the *petits paquets* would appear only if every company were to preserve a support up to the decisive stage of the action.

11. COMPARISON BETWEEN CLOSE AND EXTENDED ORDER.

In **close order** the men are placed so close together that they can be led by word of command and directly influenced by their officers. The position of the individual soldier is fixed; the men on either side of him interfere with his utilizing cover or his weapon. On terrain devoid of cover, close order formations present such large targets to infantry fire, that their employment, when exposed to the unsubdued fire of the enemy, is impossible and must lead to annihilation. Thus the hostile fire compels the most extended deployment.*

*Even during the Franco-German war it was impossible to employ close order formations in the first line, when opposed by an unshaken enemy, although this was still prescribed by the regulations. Whenever this was attempted tremendous losses resulted. In the battle of Vionville the 5th and 8th Companies of the 85th Füsilier-Regiment, formed into a half-battalion, and following the other companies of the battalion, which were pushed forward as the first line,

In **extended order** the soldier's position is not definitely fixed; he is not required to keep his body in a prescribed position, nor is he expected to handle his rifle by the numbers as in the manual. Instead, judgment, agility, courage, confidence in himself, skill in handling his weapon and in taking full advantage of the accidents of the ground, as well as unremitting attention to his leader, are demanded of the skirmisher.

The difficulties of troop leading are, moreover, increased by the noise and other disorganizing influences of the fight, especially in broken or wooded country. Whether an organization is thoroughly trained and disciplined is best shown in extended order fighting, for, as the direct control of the leader on his command decreases, the demands made on the initiative of the individual soldier increase out of all proportion. It is at any rate more practical to develop this initiative than to try to prevent the disorganizing effect of combat by restricting the personal freedom of the individual soldier.

In order to keep troops well in hand and to deploy them quickly in any direction, it is requisite that close order formations be retained as long as the terrain and the hostile fire permit. After an action, in order to make a renewed employment of the troops possible, they must be assembled

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suffered in five minutes a loss of 9 officers and 150 men (out of a total of about 400 men) from infantry fire at 1000 to 1200 m. "The impression produced was so overpowering that the commands for extending and deploying could not be executed at all and that the half-battalion had to be withdrawn in rear of the cemetery where it was assembled by the three officers still remaining." *Geschichte des Regiments Nr. 35*, p. 23.

In cases where troops appeared in close order such losses were not at all exceptional.

On August 18th, 1870, the Füsilier-Battalion of the 85th Infantry, advancing from Vernéville, at first in double column, then in half-battalion column, to within 400 paces of the enemy, lost 12 officers, 32 non-commissioned officers, and 437 men killed and wounded (52%) in 20 minutes by the cross-fire of hostile artillery and mitrailleuse batteries. At 800 paces from the enemy the fragments of the battalion were assembled in three platoons. *Gen. St. W.*, II, p. 724 *Der 18. August*, p. 152.

The success of the bayonet attack made by the 9th Company of the 29th Infantry at St. Quentin may be explained by the inferiority of the opponent. *Geschichte des Regiments Nr. 29*, p. 499.

in close order without regard to the previously existing organization.

In night combats, in actions against cavalry not supported by other arms, in putting down rebellions, and frequently in colonial wars* as well, the importance of close order formations increases when the troops show a disposition to get out of hand.

In extended order, infantry can most easily surmount obstacles, cross difficult terrain, and take the fullest advantage of the accidents of the ground as cover against hostile fire and as rifle rests. In extended order, infantry is, moreover, able to develop its fire power most effectively, while at the same time offering the smallest possible targets to the hostile projectiles. Thus the *skirmish line* is the principal combat formation of infantry; by means of it a combat is initiated and carried through to the end.

Close order is best adapted for establishing discipline in the simplest and most rapid manner by means of drill. At Jena the Prussian battalions were not defeated because of their drill, but because they were poorly led. What function drill had fulfilled at that time is pretty well illustrated by the heavy losses sustained by the Prussian infantry and by the fact that, although placed in a situation to which they were entirely unaccustomed, the troops retained their steadiness. No properly led army has been able to dispense with drill in developing its discipline. In the days of linear and column tactics the ultimate object of training was the leading of battalions in close order, in magnificent array, against the enemy. By means of drill a passive discipline was to be created in which intelligence played no part whatever. We know with what energy the army of the First Napoleon was drilled according to the wholly superannuated regulations of linear tactics in the camp at Boulogne and

*The British *Infantry Training* contains special regulations governing "savage warfare," in which close order battalion formations are explicitly given the preference (order in echelon, square).

during the brief pauses between campaigns. A well drilled organization has ever, when well led, proved equal to the occasion.* The electrifying word of command is an important factor in assisting an organization accustomed to it to overcome difficult situations. No leader will voluntarily dispense with this aid. When Austrian shells struck the company of Count Finkenstein during the advance against the Shipwald, that officer halted his command, brought it to shoulder arms and did not continue the movement until order had been completely restored.

General v. Blume considers drill and skirmish training two distinct methods by means of which efficient soldiers may be created. To quote: "In this connection the most perfect results would undoubtedly be attained by efficient drill and thorough skirmish training." Where both these methods cannot be coördinated, training in extended order fighting should take precedence. General v. d. Goltz raises the objection that this might perhaps produce skirmishers, but not soldiers, *i.e., men whose devotion to duty surpasses their fear of death.* General v. d. Goltz is right in demanding combat drill. In this term he includes the painstaking execution of all those accomplishments which the skirmisher needs in action and which he should be able to use correctly and quickly without lengthy deliberation. To this category belong rapid loading and setting of the sight, good pointing in any position, accurate aiming, cool firing, quick locking of the piece, prompt jumping up for the advance, taking advantage of accidents of the ground in lying down for the purpose of heightening the fire effect, crawling forward with or without firing, etc., etc. Since all these things must be practiced individually, and since many of them do not permit of simultaneous execution by an entire unit, we usually speak of combat training instead of combat drill, without, however, intending any other meaning.

*Compare herewith *Der 18. August*, p. 463, in regard to the importance of discipline in the execution of the attack on St. Privat.

"Drill is always mechanical. The instructor can make the skirmisher load quickly and carefully, can cause him to take the position of aim, just as he drills the correct execution of present arms and the rise preparatory to advancing by rushes. Training is directed at the mentality of the man, it makes him independent and allows him to exercise initiative, even when he is no longer directly under his superior officers' influence, and when, in a critical hour, he is no longer able to follow their example.

"Drill and training are both justified, each in its appropriate sphere; the scope of both is closely defined and neither one could be dispensed with. 'Drill' assists in creating the 'soldier,' because it develops the characteristics which must be required of a 'soldier': Endurance in surmounting hardships and dangers, unquestioning subordination of his will to that of the leader, tenacity and trustworthiness, skill in handling his weapon and in utilizing the ground. The addition of training will, of course, increase the value of this 'soldier' very considerably.

"Training alone will never attain this object. To arouse and develop the man's intellect may make him a good skirmisher, a skillful member of a patrol, but for battle he remains incomplete, since his awakened mental powers have not been made available by the disciplining drill. His energies are not governed by a higher will. Nothing can give us the assurance that he may not fail at the most decisive moment. He is no soldier."*

The French, for reasons inherent in their character, discard this drill and seek to replace it by developing the moral factors: "Moral powers are the mightiest pillars of success. Honor and patriotism fill troops with the noblest devotion. The spirit of self-sacrifice and the determination to win ensure success; discipline and steadiness guarantee the influence of the leaders and the coöperation of all the elements."†

*V. D. GOLTZ, *Zur Gefechtsausbildung*, p. 26.

†*Introduction to the French Infantry Drill Regulations.*

"However, when necessity demands the creation of new organizations —whether militia, volunteers, or *gardes mobiles,*—it is a great mistake to expect everything from moral factors; even though hatred of the enemy, enthusiasm for the fatherland, the republic or for glory, rise to the highest pitch. 'Victory or death' is the watchword when marching out—but neither is quickly attainable; weeks and months of the severest hardships, exhausting marches, wet and hungry bivouacs must first be endured. Very soon the intoxication of enthusiasm is gone and reality weighs heavily on the sobered men. Finally the enemy is confronted. But he is not to be annihilated at once by a rapid assault—not at all; the advance is made very slowly and the highest enthusiasm is given ample time to evaporate during the many hours in which death is constantly faced." LAYMAN.

For enthusiasm, we would substitute faithful, unselfish performance of duty, and unquestioning subordination of the will of the individual to that of the leader. To be sure, on days of success enthusiasm will suffice, but not when everything around us begins to waver and to yield. The importance of drill, which cannot be replaced by anything else, does not become apparent until all enthusiasm disappears, until the leader becomes conscious of the specter of panic which stalks by the side of enthusiasm.

"Discipline," says Archduke John in his well-known work *Drill or Training,* "must not be confounded with the snappy drill of troops, and can, moreover, not be attained by means of it. The straightjacket has never yet cured one insane person; the soul cannot be disciplined through the body. One must work from the inside and not from the outside. It is of little value if the outer annular rings of a tree are beautiful and regular; it will rot and die in spite of its deceptive appearance; if its heart is not healthy, the first storm may bring it down. The inner man must look beautiful; firmness and steadiness are needed within; the marching tread of feet on the drill ground plain are of no moment; the beat of the heart filled with the spirit of self-sacrifice is the important factor."

It is well known that Emperor William I. changed the title of the brochure *Drill or Training,* written by Archduke

John, to *Drill and Training*. Training necessitates a good corps of instructors and a great deal of time, whereas drill will accomplish in a shorter time results which are not so enduring. It is again presupposed that the recruits are willing to be trained, otherwise all efforts are unavailing. The question whether the individual man can be influenced sufficiently in a two years' service period to overcome even sentiments inimical to the state, instilled in him by friends or relatives, can only be answered by the next war. To answer this question at the present time would be premature; but one thing is certain: the sharp word of command, the whole influence of a well-organized body of troops, will sweep along even the reluctant in the hour of danger.

The importance of the tactical formations which at one time constituted minor tactics has doubtlessly decreased; unfavorable formations, in so far as they increase or reduce losses, increase or restrict one's fire effect, can be offset by the fighting efficiency of the soldier and by proper leading. The unfortunate termination of the battle of Jena for the Prussian arms, as already mentioned, bears no relation to drill as such. The formations in themselves were not at fault, for linear tactics scored the greatest successes in the Peninsular war and at Waterloo; and at the Katzbach, Prussian battalions of Borke's Brigade in line overran the French columns. Within certain limits, numerical inferiority and lack of fighting efficiency can be offset by leadership. But numbers and fighting efficiency will always remain the decisive factors for success.

The victory of Spicheren was due primarily to the troops and not to leadership. This is likewise true of Wörth. The lion's share in the victory of Vionville is certainly due to the fighting efficiency of the gallant Brandenburgers. Finally, at St. Privat, the crisis produced by the commanders was successfully overcome only by the tenacity of the troops, who maintained their positions for hours under the most destructive hostile fire.

Increased demands must at present be made upon the combat training of the soldier. The combat requires enterprising, self-sacrificing, cold-blooded men who are imbued with the spirit of the reckless offensive. "The combat requires thinking leaders, *trained to rely upon themselves,* and *skirmishers having initiative.*" (Par. 2 German I. D. R.). "Judgment, self-confidence and boldness must be aroused and continually developed in the young soldier." (Par. 144 German I. D. R.). "The aim of all exercises should be to develop the soldier into a self-thinking and conscientiously working skirmisher." (Par. 158 German I. D. R.). "All training should be directed toward producing self-reliance in leaders and in the individual skirmisher." (Par. 251 German I. D. R.). "The infantry must nourish the desire for taking the offensive; its actions must be guided by the one thought, *forward, at the enemy, no matter what the cost.*" (Par. 265 German I. D. R.). "The continuous desire to press forward and the endeavor to surpass all other units must animate all parts of the attacking force." (Par. 327 German I. D. R.). "It should be a point of honor with skirmishers not to allow the supports to overtake them earlier than the moment of penetrating the enemy's position." (Par. 348 German I. D. R.). "Those who fall must be left behind. These sacrifices should not lead to an abatement of the pursuit any more than the losses sustained in the previous fight caused the renunciation of the purpose of the combat." (Par. 424 German I. D. R.). "A commander who is ever willing to shoulder responsibility will not shrink from throwing troops into the fight *regardless of consequences* even when the outcome of the battle is doubtful." (Par. 304 German I. D. R.).

If love of life and fear of death are overcome in a soldier by discipline, in an officer this must be brought about by a higher sense of duty and honor. On the battlefield the desire to live does not appear in a cultured person, as a rule, in its ordinary, undisguised form; it makes itself felt rather

in the shape of tactical scruples, whether the leader would be justified in leading his subordinates to certain death, whether it would not be his duty to preserve the force entrusted to him for more important duty in the service of the fatherland, instead of sacrificing it uselessly. If, in addition, an officer has been allowed, in time of peace, to criticise, from the start, an order of his superior with reference to its feasibility, it may easily happen in the stern reality of actual war that a subordinate leader, neither especially courageous nor ambitious, succumbs to the seductive whisperings of his senses on the approach of danger and sees in caution the better part of valor. It is always suspicious if troops have become accustomed to consider insignificant losses, common to colonial wars, accompanied by great physical exertions, as indications of good leadership.* Great victories are, as a rule, invariably accompanied by great losses.

*In this connection and in regard to the British losses in South Africa, see my lecture: *Die Lehren des Burenkrieges* (1904), p. 8, et seq. The behavior of Sir Redvers Buller at Colenso and Spionskop is interesting. See *The Times History of the War in South Africa*, III, pp. 284, 286, 297, 318.

III. THE POWER OF FIREARMS AND EXPEDIENTS FOR MINIMIZING LOSSES.

A. THE POWER OF FIELD ARTILLERY.

1. THE FIELD GUN.

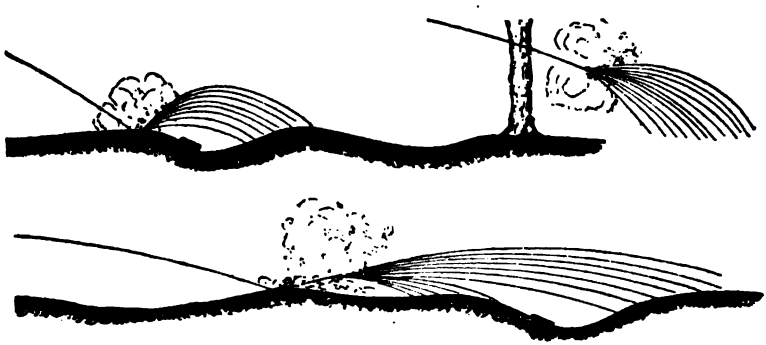
The field artillery of all the states that need be considered is armed with a rapid-fire gun provided with shields and capable under peace conditions of firing as many as twenty shots per minute. Its caliber varies from 7.5 to 8.38 cm. (Germany, 7.7; France, 7.5; Russia, 7.62, and England, 8.38 cm., the last-named being an 18 pdr.). The German gun fires shrapnel weighing 6.85 kg. (the Russian, 6.5, and the French 7.25 kg.) and high explosive shell of approximately the same weight, with an initial velocity of 465 m. (the Russian 588 and the French 530 m.). The projectiles are burst through the action of combination fuzes (in Germany graduated to 5000, in France and Russia to 5500 m.). The projectiles have a maximum range of 8000 m., when percussion fuze is used. Canister has been replaced by shrapnel, which bursts approximately 200 m. in front of the gun when the fuze is set at zero. The German field artillery is also equipped with a light field howitzer, cal. 10.5 cm., which fires shrapnel weighing 12.8 kg. (time fuze ranging from 300 to 5600 m.) and shell weighing 15.7 kg. (time fuze ranging from 500 to 5600 m.). The Germans use heavy field howitzers (cal. 14.91 cm., firing shell that has an extreme range of 6870 m.) in the heavy artillery of the field army. France uses the 15.5 cm. Rimailho howitzer, England a 12.7 cm. howitzer and another long piece of 12 cm. caliber.

Percussion shrapnel is used for defense at short range, and in fire for adjustment; its effect depends upon the range

and the nature of the ground. It is effective against troops lodged in tall timber. Masks, branches of trees, etc., frequently cause the premature burst of the projectiles.*

Percussion shrapnel is effective only when bursting immediately in front of the target (5—25 m. in front of it, depending upon the range). However, even in this case, the bullets often pass over low targets, such as skirmishers lying down, and low parapets afford sufficient protection. An adequate effect can be obtained only when the fire is directed on vertical targets. Soft ground, newly ploughed fields, terrain covered with snow or underbrush, small folds of the ground, or a rising slope, diminish the fire effect. When the angle of fall is 10 degrees or more (with the German piece at ranges of 3300 m. and over) half of the bullets penetrate the ground, the remainder ricochet and pass on at a greatly reduced velocity. The explosive or incendiary effect of shrapnel is insignificant owing to the smallness of the bursting charge. However, some incendiary effect is possible if the projectile strikes an easily inflammable target.†

Percussion Shrapnel.



Time shrapnel (used in Germany up to 5000 m.) is fairly independent of the terrain, the burst being

*Engagement of Azay (6th January, 1871). *Geschichte des Regiments Nr. 20.* HOFFBAUER, *Deutsche Artillerie*, I, pp. 16 and 49. *Taktik*, VI, p. 42.

†Consult *Taktik*, VI, p. 45, in regard to the incendiary effect of projectiles.

easily observed since the bullets are embedded in a "smoke-producing composition." The extreme range at which this projectile can be employed is fixed by the facility of observing the fire and by the remaining velocity of the shrapnel bullets, both of which diminish as the range increases. Field guns, model '96, may be effectively employed up to a range of 4000 m.; under 3000 m. their fire is so annihilating that decisive results are produced in a short time. (Par. 630 German F. S. R.). The use of the combination fuze, on account of its certainty of burst, either by time or percussion, permits the trajectory to be accurately determined in every case. This fuze also makes it possible to employ shrapnel against rapidly advancing targets, and in warding off a sudden attack at short range. The French Regulations give the width of the beaten zone of a single shrapnel as 20, that of two from the same piece as 25 m. The maximum depth of the beaten zone is 300 m. The angle of the cone of dispersion of the German shrapnel, model '96, is 16 degrees at 2000 m. German shrapnel (model '91) fired at a line of infantry did not strike lines following 250 m. in rear of the first, whereas in case of base charge shrapnel these lines would be safe only at 350—400 m. from the first line. The German shrapnel gives very good results when set to burst 30 to 150 m. in front of the target, the height of burst being regulated accordingly (approximately 1/3 of the whole number of hundreds of meters of the range). At ranges under 1500 m., an adequate fire effect may, however, be expected even when the fuze is set to burst the projectile 300 m. in front of the target. (Par. 30 German F. A. F. R.).

Shrapnel is most effective against skirmishers lying down from 1000 to 3000 m. when burst 28 to 22 m. short, and against standing skirmishers at the same ranges when burst 56 to 45 m. short. The two tables given below, borrowed from the work of Lieutenant-General Rohne on artillery tactics,*

*ROHNE, *Die Taktik der Feldartillerie*, Berlin, 2nd Edition, p. 9.

give an idea of the effect of a single time shrapnel, and of the effect per minute of shrapnel fire after adjusting upon the target:

TARGETS.	When firing at the targets named (1 skirmisher per m.) with time shrapnel, mod. '96, set to burst 50 m. short, the following *hits per shrapnel* may be expected after the adjustment has been effected:				
	500 m.	1000 m.	2000 m.	3000 m.	4000 m.
Skirmishers standing.....	18.4	14.2	12.0	11.0	10.4
Skirmishers kneeling.....	10.6	8.2	6.9	6.3	5.8
Skirmishers lying down.....	6.4	4.9	4.1	3.8	3.5
Head targets.....	3.5	2.7	2.3	2.1	1.9

TARGETS.	When firing at the targets named (skirmish line with 1 skirmisher per m.), under service conditions, with time shrapnel, mod. '96, set to burst 50–100 m. short, the following hits per minute may be expected on an average:				
	500 m.	1000 m.	2000 m.	3000 m.	4000 m.
Skirmishers standing.	364	202	109	46	14
Skirmishers kneeling.....	210	117	63	27	8
Skirmishers lying down.....	126	70	38	16	5
Head targets.....	70	39	21	9	3

More than 80% of the men struck by fragments and bullets from shrapnel bursting within 100 m. are disabled. The penetration of shrapnel bullets is so great, at ranges under 2000 m., that when they strike bones or vital organs of horses, they produce instant incapacity for action. This is especially true when the interval of burst is less than 100 m. The effect of shrapnel directed against batteries provided with shields is insignificant. Time shrapnel is the principal projectile em-

ployed by artillery against animate objects, provided these are not located immediately in rear of parapets, within tall timber, or under bomb-proofs. This projectile is ineffective against such cover on account of the flatness of the trajectory and the sensitiveness of the fuze.

Shrapnel is to be supplemented by **shell** filled with explosive charge, model '88, which has a great explosive effect at extreme ranges and in tall timber. (See pars. 159—160 German F. A. F. R., in regard to action against shielded batteries).

Percussion shell, on account of its very sensitive fuze, bursts on penetrating the shield, while percussion shrapnel goes entirely through the shield and bursts about ½ m. in rear of it.

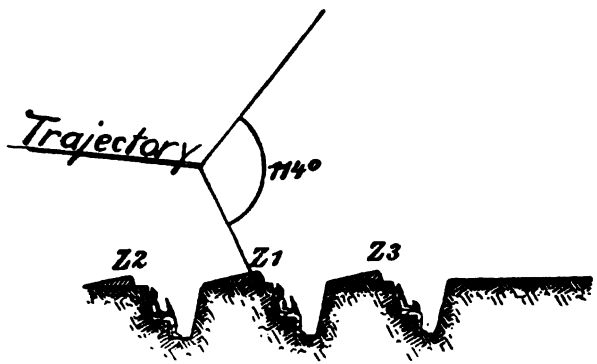
Percussion Shell, Model '96.

Targets located immediately in rear of parapets or under light splinter proofs may be reached with time shell burst directly over or close in front of them. The depth of the beaten zone of this projectile is small, seldom exceeding 50 m., even when the fire is directed against targets in the open. About 75% of all the fragments are capable of inflicting disabling wounds when the interval of burst is short. The peculiar character of the projectile necessitates a very careful adjustment in range and in height of burst. The French *obus allongé,* a high explosive percussion shell (melinite charge; angle of the cone of dispersion exceeds 100 degrees) is employed only for the destruction of material objects.*

*When firing on animate objects, the beaten zone of this projectile does not exceed a space 50 m. wide and 20 m. deep, but the concussion of the explosion will undoubtedly be felt at a greater distance. The explosive effect of the projectile is equivalent to that of 30 kg. of powder. The explosion of the projectile produces a cone-shaped crater having a diameter of 2 and a depth of 0.50 m. Ten melinite shells per running meter are required to destroy a parapet 3 m. thick and 2.30 m. high.

The French projectile, on account of the fuze used, bursts only after it has pierced thin walls or shields.

Time Shell, Model '96.



2. THE LIGHT FIELD HOWITZER.

The realization that the power of resistance of a defender lodged in deep trenches, could not be broken by the fire of guns having a flat trajectory, led to the re-adoption of a gun capable of high angle fire, which had been eliminated from the field artillery upon the advent of rifled cannon.*

In direct and curved fire, the light field howitzer, model '98, employs shrapnel weighing 12.8 kg. (500 jacketed bullets, @ 10 g.; time fuze graduated from 300 to 5600 m.) and shell weighing 15.7 kg. (0.37 kg. explosive charge, model '88; time fuze graduated from 500 to 5600 m.). As delay action fuzes are used, it is possible to utilize to the fullest extent the power of penetration of the projectile before it bursts.

A single shrapnel from a light field howitzer produces a greater number of hits, when the point of burst is favorably

*After March, 1859, the artillery of a mobilized Prussian army corps consisted of three horse batteries, each armed with six 6-pounder guns and two 7-pounder howitzers; six foot batteries, each armed with eight 12-pounder guns; and three foot batteries, each armed with eight 7-pounder howitzers. Thus the artillery of an army corps numbered 30 howitzers and 66 guns.

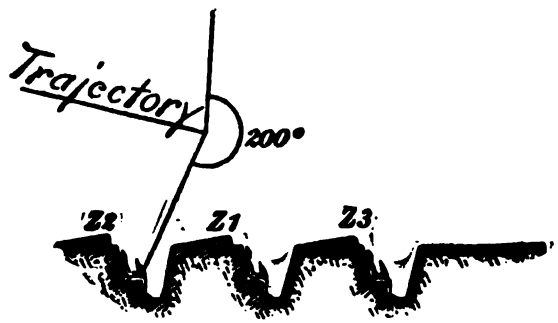
situated, than one fired from a field gun. However, the projectiles fired from the latter have a deeper beaten zone on account of the flatter trajectory of the piece, and a greater penetration owing to their greater remaining velocity. The German Artillery Firing Regulations (par. 30) consider the effect of both projectiles "very good" and of equal value at the principal ranges, when burst at a moderate distance (30 to 150 m.) from the target. The effect of shrapnel from the field gun and from the light field howitzer is considered adequate at ranges under 1500 m., when bursts are regulated to occur within 300 and 200 m., respectively, in front of the target. The superiority of the shrapnel fired from a field gun is due to the greater penetration of the jacketed bullets (a result of greater velocity of the projectile itself at the point of burst). But in this connection it is to be borne in mind that the effect of single shots only is here considered. The shrapnel fire of the field gun is considerably superior to that of the howitzer. This is due to the fact that the howitzer fires more slowly than the field gun and must expend twice the weight of ammunition to produce the same results. If, in addition, it is remembered that the field battery carries approximately 2½ times as many shrapnel as the light field howitzer battery, it is obvious that the fire of the former will be 2½ times as effective, against targets in the open, as that of the latter.

The superiority of the heavier projectile asserts itself when it becomes necessary to destroy material objects.

Direct fire with time shell is employed against troops immediately behind cover. The shell is burst immediately in front of, over, or in rear of the target, which is thus struck by splinters from above. The more nearly perpendicular the splinters strike the target, and the greater their number and weight, the greater will be the effect produced. The angle of the cone of dispersion is about 200 degrees; with appropriate points of burst, fragments weighing 15 g. (80%) incapacitate for action. In curved fire, at ranges

beyond 2100 m., shell with delay action fuze is capable of penetrating the splinter proof cover usually employed in the field. At ranges under 2100 m. its angle of fall is too small to make an adequate effect certain.

Time Shell, Model '98.



3. THE HEAVY FIELD HOWITZER.

The heavy field howitzer employs shell weighing 39.5 kg., containing an explosive charge of 0.85 g., and fitted with a percussion fuze either with or without delay action. This shell is designed to penetrate the roofs of splinter proofs. An earth covering 5—6 m. thick is necessary to afford protection against these projectiles. At 3000 m. a 15 cm. shell produces a crater 1 m. deep and 2.4 to 3.6 m. in diameter, *i.e.*, 2 cu. m. (in made ground this crater is three times this size). The heavy field howitzer is a very effective weapon against shielded batteries. A single shell, owing to its lateral explosive effect, is capable of placing a whole battery temporarily out of action.

4. EXPEDIENTS FOR MINIMIZING THE EFFECT OF FIRE.

Movements of infantry under artillery fire are unavoidable when firing lines are to be reinforced and when troops intended for the decisive attack are to be pushed closer to the enemy. Formations calculated to minimize the effect of the

hostile fire must be taken up in time, since it is not always possible to make use of cover. The efficacy of the fire depends upon the accurate determination of the range and height of burst (fire for adjustment) and upon the careful observation of the subsequent fire (fire for effect).* The effect of this fire is considerably increased when the opponent's infantry, against whom the fire is directed, takes up unsuitable formations (particularly broad line formations). Infantry has frequently found it advantageous to advance in small detachments moving rapidly at irregular intervals in extended order.

(a) Increasing the Difficulties in the Adjustment of the Hostile Fire.

A battery requires about 0.8 minutes (5 to 6 rounds with percussion fuze) to secure adjustment at ranges up to 750 m. The time required for securing adjustment at the longer ranges is as follows:

At 800—1500 m., on low infantry targets, 1.5 min., 6—9 rounds with perc. fuze;
" 1700—2250 m., " " " " , 3.7 " , 11 " " " " ;
" 2000—3000 m., on artillery targets, 4.6 " , 11 " " " " ;

Narrow columns moving to their right or left front are very unfavorable targets for artillery, as it is very difficult for a battery commander to determine the relative position of bursts on the flank of a column with respect to the leading element thereof. Such shots are frequently considered as over. Numerous small columns, which make it difficult to designate a target, increase the time required by the hostile artillery to secure adjustment.

Troops should not be posted in the vicinity of con-

*The color of uniforms exerts considerable influence on observation. According to experiments made in France, colors rank as follows as regards visibility: white (invisible at night), light blue, alizarine red, green, dark brown, gray, or yellowish brown. *Schweizer Zeitschrift für Artillerie und Genie*, 1896, I, p. 39. The following colors protect against heat, in the order named (in reverse order against cold): white, red, orange, yellow, green, blue, violet, black. The position of gray in the list depends upon the amount of white or black mixed with it.

spicuous objects, as, for example, trees, visible at a great distance.* Intrenchments that have just been thrown up should be made to look as nearly as possible like the surrounding country by covering them with snow, sod, or brush. It is made more difficult for the hostile artillery to secure adjustment, if our infantry changes position to the front or to a flank, if it moves rapidly or advances by rushes.

It is easy, as a rule, for the artillery to adjust its fire upon masks, but difficult to determine the distance between mask and target. It is an advantage when masks are situated obliquely to a position. As masks (rows of trees) may cause the premature burst of projectiles having percussion fuzes, they should be at least 200 m. from the troops they are to screen.† When so situated they frequently afford better protection than actual intrenchments.

(b) Minimizing the Effect of Fire.

Formations that increase the effect of artillery fire, as for example lines and columns, and positions in which a flank is refused, should be avoided. It is a good plan to increase

*The cutting down of a poplar at Königgrätz decreased the effect of the Austrian artillery fire, which, previous to this, had caused rather serious losses. *Geschichte des Regiments, Nr. 2*, p. 36. A similar effect was produced by tearing down a house at Lovtcha. KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg*, I, p 59.

†Fight of some Prussian batteries against a French battery masked by chaussee trees at Weiszenburg. See HOFFBAUER, *Deutsche Artillerie*, I, pp. 13 and 49. The 4th Light and the 4th Heavy Batteries of the 10th Field Artillery (German) were able to maintain their position east of Mars-la-Tour, under the fire of superior hostile artillery, because they were screened by the trees and the embankment of the chaussee thirty paces in their front. *Kriegsgeschichtliche Einzelschrift*, 25, p. 18.

The sustained bombardment of Schlosz Ladonchamps (situated on the Moselle flats north of Metz) with 12 cm. guns, which fired 200 shots per day from Oct. 9th to 10th, and 100 per day from Oct. 11th to 16th, 1870, was unsuccessful, because the percussion shells were ineffective. This will not be changed in the future by the adoption of high-explosive shells. According to DICK DE LONLAY, the garrison of the castle and its park lost only 5—10 men per day during this time. The defensibility of the castle was not impaired, although projectiles finally fell into the building itself during the sustained bombardment. According to the same author (IV, p. 556) 1,022 shells fell into the park and castle of Ladonchamps on October 7th, but only ten men were placed out of action.

the number of targets and to employ narrow columns (column of twos) that are not too deep. Supports must be far enough in rear (300—400 m.) to prevent two targets being struck by one and the same shrapnel.

Of the close order formations used in the Russo-Japanese war, platoons or sections in columns of squads or twos,* separated by a maximum interval of 50 paces, were indeed found more suitable under fire than line formations, but the losses were nevertheless very serious except where cover screened the advancing troops from view or afforded them actual protection.

During the Franco-German war, line of platoons in columns of twos was found advantageous on several occasions.† This formation has the following disadvantages, however: it is very susceptible to flanking fire; the influence of the officers is principally restricted to the leading elements; intervals are easily lost and on that account it becomes more difficult to form line. It would seem to be better, therefore, to advance in line of platoons (or sections) in columns of squads, or, under flanking fire, in line of squads in columns of twos or files. In the last-named formation the intervals between squads are easily lost, however, and the company then becomes a dense skirmish line of from four to six ranks. To echelon the platoons slightly has very little value on account of the depth of the beaten zone of modern shrapnel.

In attacks made during the latter part of the Russo-Japanese war, both belligerents finally made use of thin successive skirmish lines for advancing; these lines followed each other at 200—300 m. and united again on reaching cover.

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*The advance against Beaumont and the height of Chancy during the battle of Beaumont. HOFFGARTEN-HEIDLER, *Beaumont*, pp. 124 and 238. *Geschichte des Regiments, Nr. 93*, II, p. 97. At Gravelotte this formation was employed with advantage by the *Königin* Regiment during its advance on Amanweiler, and later in the campaign during the assault on Le Bourget. *Geschichte des Regiments Königin*, pp. 9 and 132.

†This formation is also well adapted for passing through woods. *Taktik*, VI, p. 108.

5. THE RESULTS OBTAINED BY ARTILLERY AGAINST VARIOUS TARGETS.

Germany. According to computations made by Lieutenant-General Rohne,* the following hits may be expected from every time shrapnel, model '96, when burst an average of 50 m. short of the targets named:

Range m.	Standing.	Kneeling.	Prone.	Intrenched Skirmishers.†
500	18.4	10.6	6.4	3.5
1000	14.2	8.2	4.9	2.4
2000	12.	6.9	4.1	2.3
3000	11.	6.3	3.8	2.1
4000	10.	5.8	3.5	1.9

The number of hits per minute obtained by a battery firing 50 shots at 500 m., 30 at 1000 m., 20 at 2000 m., 10 at 3000 m., and 4 at 4000 m., is as follows:

Range m.	Standing.	Kneeling.	Prone.	Intrenched Skirmishers.‡
500	364	210	126	70
1000	202	117	70	39
2000	109	63	38	21
3000	46	27	16	9
4000	14	8	5	3

**Die Taktik der Feldartillerie,* p. 9 *et seq.*

†One skirmish figure per meter.

‡One skirmish figure per meter.

*France.** According to the French Field Artillery Regulations (footnote to par. 277), a gun firing time shrapnel covers effectively a front of 25 m., and a battery of four pieces, a front of 100 m. This intensity of fire, which is obtained when each piece fires one shot with proper corrector and range settings (the battery four shots) Aubrat calls *"Density 4."* When *rafale* fire (two shots per piece) is employed against a front of 100 m., with proper corrector setting, density 8 is obtained. When the front exceeds 100 m., the deflection of the pieces must be changed between successive shots (*tir avec fauchage*). To obtain density 8 against a front of 150 m., each piece must fire three shots, as prescribed in the regulations. When progressive fire (*tir progressif*) is employed, four different ranges are given, of which only one can be considered effective. When not sweeping, in this fire, each piece fires two shots, thus also obtaining a density of 8. A density of 1 always corresponds, therefore, to one round, fired, with proper corrector and range settings, against a front of 100 m. When a battery (four pieces) fires one salvo against a target having a front of 50 m., density 8 is obtained; by firing two salvos, density 16 is obtained.

The *Commission d'études pratiques du tir* has made a thorough investigation into the effect produced by shrapnel fire. The following table gives a general idea of the effect to be expected when firing against service targets (*i.e.*, the percentage of figures one may expect to hit when employing fire of varying density):

*The following is taken from Lieutenant-General ROHNE'S essay on the work of Squadron Commander AUBRAT, *Les exercices de service en campagne.* The essay mentioned appeared in the December, 1907, number of *Artilleristische Monatsschriften.*

TARGETS.	DENSITY.			
	4	8	16	32
	%	%	%	%
Infantry skirmishers standing in the open, or a single rank line	25	40	65	———
Skirmishers lying down; gun crews under fire but protected by shields of the French type. Space between shields and ground not closed	7.5	15	25	40
Infantry lying down behind knapsacks; gun crews protected by shields. Space between shields and ground not closed	———	7.5	15	25
Infantry lying down behind their knapsacks, but not firing; gun crews protected by shields. Space between shields and ground closed so that bullets cannot pass through	———	0—2	———	———

A skirmish line 100 m. long, and lying down, would suffer a loss of 15% irrespective of its strength, from progressive fire (*tir progressif;* 32 rounds, density 8). If the interval between skirmishers in the open amounts to 1½ paces, for instance, the front would contain 62 skirmishers, and the resulting loss would amount to 9 men. If the men have placed their knapsacks in front of them, the loss would be reduced by half. A line of skirmishers of the same length and strength as the one considered above, would suffer a loss of 40%, or 25 men, when standing up or advancing. About 1½ minutes are required to fire one *tir progressif,* after adjustment has been secured. The same effect could be obtained in about 20 seconds by firing a *rafale* of eight rounds, provided the battery has accurately adjusted its fire.

6. THE EFFECT OF SHRAPNEL BULLETS ON ANIMATE TARGETS.*

The wounds produced by shrapnel bullets are similar to those caused by the lead bullets of the infantry weapons of the past. When the bullet strikes normally to the surface, it produces a wound circular at the point of impact and considerably enlarged at the point of exit; bones are frequently shattered; and the most serious effect is the introduction of foreign substances, such as pieces of cloth, particles of earth or sand, or of the material in which the bullet is embedded.

The effect of shrapnel bullets on animate targets depends upon the striking energy of the bullets (expressed by kgm.) and on their sectional density, those of smaller diameter having the greater penetration. The closer the point of burst is to the target, the greater the velocity, and, naturally, the effect.

Opinions differ as to the amount of "striking energy" necessary to put animate targets out of action. In France, an energy of at least 4.8 kgm. is considered necessary to disable human beings, and for horses an average of 19 kgm., whereas in Germany, an average energy of 8 kgm. is deemed sufficient. The 10 g. hardened lead bullet, having a diameter of 12.3 mm., retains this energy until its remaining velocity is only 120 m. At ranges up to 1500 m., over 80% of the men struck by fragments and bullets from shrapnel, bursting within 300 m. (and beyond this range from shrapnel bursting within 150 m.) are put out of action. (Par. 30 German F. A. F. R.). In comparison, artillery projectiles produce a greater number of fatal wounds than infantry projectiles.

It is worthy of note that the packed knapsack affords

*BIRCHER, Colonel and Corps Surgeon of the Swiss IInd Army Corps, *Die Wirkung der Artillerie Geschosse*, Aarau, 1899. KÜTTNER, *Kriegschirurgische Erfahrungen aus dem südafrikanischen Kriege 1900*. Tübingen, 1900. HILDEBRAND, *Die Verwundungen durch die modernen Kriegsfeuerwaffen*. I (1905). ROHNE, *Über die Wirkung des Schrapnelschusses*, in *Militär-Wochenblatt*, No. 74, 1902.

protection against all shrapnel bullets having a velocity of 100 m. and against half of those having a velocity of 200 m. The overcoat roll stops shrapnel bullets having a velocity of less than 250 m. The penetration of these bullets is so great, at ranges under 2000 m., that when they strike bones or vital organs of horses, they almost invariably produce instant incapacity for action. This is especially true when the interval of burst is less than 100 m.

B. INFANTRY FIRE.*

The modern infantry rifle, cal. 6.5 to 8. mm., is a magazine arm employing steel jacketed, pointed bullets, arranged in clips. The adoption of automatic rifles is contemplated. In these rifles the recoil energy is utilized for throwing out empty shells and for placing a fresh cartridge into the chamber at the same time. The objections made to the adoption of such a rifle (complexity of the mechanism, danger of wasting ammunition) are similar to the reasons advanced against the adoption of breech-loading and magazine rifles. In addition to the increased rate of fire, the advantage of eliminating the effect of the recoil on the skirmisher must not be underestimated. Moreover, the elimination of the recoil makes a further increase in the initial velocity of the projectile possible.

The effect of infantry fire may be considered from two points of view, viz.: the effect on the enemy of a single projectile, and the effective hit in itself.

1. THE EFFECT OF A SINGLE PROJECTILE ON ANIMATE TARGETS.†

During the Russo-Japanese war the contending parties used the following small arms and projectiles:

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*Lieutenant-General ROHNE, *Schiesslehre für die Infanterie.* Colonel MINARELLI FITZGERALD, Austrian Army, *Modernes Schiesswesen,* 1901.

†See *Löbells Militärische Jahresberichte,* 1905, p. 475, and 1906, p. 412, which contain complete references to military literature. *Militär-Wochenblatt,* No. 1, 1906.

	Rifle.	Model (year)	Cal. mm.	PROJECTILE. Description.	PROJECTILE. Weight. g.	Initial Velocity. m.
Japan...	Arisaka..	'97	6.5	Hardened lead core with copper-nickel jacket.	10.5	715
	Murata...	'94	8.0		15.42	564
Russia..		'91	7.62		13.7	615

The ballistic qualities of the *Arisaka* rifle were superior to those of the Russian arm, but the maiming effect of the two rifles was about equal. The striking energy of the projectiles was not sufficient in every case, however, to put a man out of action. The explosive effect produced by bullets striking interior organs and bones at short ranges (within 500 m.) was more evident in wounds made by the 8. mm. than by the *Arisaka* rifle.*

At mid ranges the wounds were generally of a mild character, unless produced by tumbling bullets.†

Experiments prove that a projectile will tumble if it encounters varying resistance (for example, if the projectile strikes an obstacle, even if that be only a twig) or if it penetrates materials of different density (for instance, if, in penetrating a body, it strikes first upon a fleshy part, then upon bones). In the last mentioned case the bullet will frequently tumble in the body. If a projectile be fired through a series

*"The projectile that penetrates animal organisms displaces and consequently destroys the tissue fibers lying in its path. The projectile communicates a portion of its energy to the molecules struck, and these in turn transfer that energy to adjoining ones. The greater the velocity of the projectile at the moment of impact, the more rapid is this transfer of motion. Especially in organs filled with fluid are the molecules, like firm bodies, thrown with the greatest rapidity. This has a destructive effect which in the past has never been observed to be so extensive, and which gives the impression that the projectile has exploded in the body. In order to produce this effect a velocity of about 350 to 400 m. is required, which was, of course, not obtainable in rifles of older pattern, and was only possible in the immediate vicinity of the muzzle. Whenever the projectile strikes a marrow bone with great velocity it shatters it completely at the point of impact, and splinters it to a considerable extent, all because the bone is filled with a liquid substance." ROHNE, *Schiesslehre für die Infanterie*, p. 69.

†See also *Ricochets*, p. 158 infra.

of boards, placed at intervals, it will tumble in the second board, or if not there, then certainly in the third board. Projectiles which ricochet on the ground before penetrating a human body change their form more or less, according to the character of the ground on which they ricochet. As the jacket is frequently torn, thus exposing the leaden kernel, wounds may be produced which will equal those made by explosive bullets.

The striking energy of the projectile is sufficient to perforate two men at 1200 m. From experiments made with the *Lebel* rifle on corpses, it appeared that the projectile passed clear through 5 bodies at 100 m., through 4 bodies at 400 m. (even when large bones were struck) and through 2 bodies at 1200 m.

In the Russo-Japanese war wounds were distributed as follows, on a basis of 100 hits: lower limbs, 39.5; upper limbs, 25.4; abdominal region, 16.5; chest, 15.5; spinal column, 15, and head, 11. Flesh wounds are generally slight. This is due to the fact that the hole made by the bullet is small, that the exterior flow of blood is insignificant, and that the wound rarely becomes infected. Projectiles remain in the body now much more rarely than in the past.

The central portion of marrow bones is frequently splintered by projectiles, while thicker flat bones (shoulder blades) are cleanly perforated.

Unless a tumbling bullet or a splinter of a bone penetrates the lungs, chest wounds appear in much more favorable forms than in past wars.*

According to observations made in the Russo-Japanese war, wounds in joints healed without suppuration, the joint

*"A soldier of the 3rd East Siberian Regiment, who had been shot in the chest, for instance, subsequently walked to the nearest railway station, a distance of over 20 km., and felt fairly well except for a slight difficulty in breathing. A lance corporal of the 36th East Siberian Rifle Regiment, having received a similar wound, began his journey to the nearest railway station on a two-wheeled cart. The motion of the cart nauseated him to such an extent, however, that he preferred to complete the journey on foot, a distance of 30 km." Dr. SELDOWITSCHI in *Wratsch*.

and its mobility being saved. Amputations were extremely rare, and the surgeon's skill was, as a rule, seldom necessary in the treatment of shot wounds. Chest wounds were slight, and often many men walked a few *versts* to the dressing station, some of them complaining of difficulty in breathing. As a rule, such wounds healed in fourteen days. Chest wounds were more serious when the heart or the large blood vessels were injured; but even in these cases cures were effected. Abdominal wounds were not so serious as in the past. Contrary to past experience, skull wounds, in which the projectile had passed entirely through the brain, were treated with fair success.

The campaigns in South Africa and Manchuria have amply demonstrated that wounds produced by jacketed bullets of small caliber are not so serious as those caused by 11 mm. projectiles. In addition, these campaigns have shown that a further decrease in caliber is undesirable from the tactician's point of view, for a hit by no means affords the certainty, in every case, of putting a man, much less a horse, out of action.

Moreover, the wounded man is cured so quickly that in a short time he can again participate in action. The British report of losses for the battle of Paardeberg, on February 18th, 1900, contains the names of a great many men who were wounded at Magersfontain on December 11th, 1899. According to British statements, 40 men out of every 100, seriously wounded by steel jacketed bullets, could be returned to duty after 36 days of surgical treatment. Dr. Küttner estimates that of 154 men hit in the chest, 73 were able to return to duty with their organizations; while, out of 92 men wounded in the knee, only 28 could be sent back to duty. Wounds produced by the small caliber *Arisaka* rifle during the Russo-Japanese war healed more rapidly than those caused by the Russian weapon. Flesh wounds of Japanese soldiers, for example, healed in ten days, those of Russian soldiers in four. The following observations were made on wounds produced by the Russian rifle: Within a week slight wounds were covered by

a scab; after three weeks they were covered by fresh skin and a part of the wounded were then able to return to the front. The remainder, irrespective of the number of wounds received by any one individual, were ready for duty in seven months. Wounds in which bones were perforated without splintering, healed in four to six weeks, so that the men could return to duty within four or five months after receiving the wound. When bones were splintered the cure was, of course, considerably retarded.

The ballistic advantages of a small-caliber projectile (undesirable from the military surgeon's point of view) have been obtained by the adoption of a pointed-nose bullet (called the "S" bullet in Germany and the "D" bullet in France).*

A further advantage of these bullets is that they produce serious wounds on account of their tendency to tumble. These wounds, while not inhuman, instantly disable the man struck, or, at any rate, postpone his recovery indefinitely.

The Effect of "S" Bullets on Corpses.

Of the Total Number of Men Hit in Each Case.		THERE WOULD HAVE BEEN		
		Fatally injured. %	Instantly disabled. %	Incapacitated for some time. %
Flesh wounds produced at	800 m	——	36.4	27.3
	1350 m	——	43.8	37.3
Bones struck at	800 m	20.3	79.2	75.0
	1350 m	11.1	88.9	88.9
Average		7.97	62.07	57.12

*

	Rifle mod. '88.	Rifle mod. '98; "S" bullet.	Lebel rifle; "D" bullet.
Caliber	7.9 mm	7.9 mm	8. mm.
Weight of bullet	14.7 g.	10. g.	13.2 g.
Initial velocity	640. m.	860. m.	730. m.
Remaining velocity at 800 m	270. m.	362. m.	377. m.
Maximum ordinate of trajectory at 700 m	3.80 m.	1.85 m.	2.10 m.

Militär-Wochenblatt, 1906, No. 53; *Vierteljahrshefte*, 1907, II, p. 281.

2. THE EFFECT OF "S" BULLETS ON MATERIALS.

The following thicknesses of dry pine are pierced by the "S" bullet (rifle model '98) at the ranges given:

60 cm.....at 100 m.
80 cm.....at 400 m.
35 cm.....at 800 m.
10 cm.....at 1800 m.

In sand and earth the penetration of the "S" bullet amounts to 90 cm. According to experiments, 3 mm. steel plates were pierced at 350 m., while hay stacks afforded protection when 4 m. thick; when of less thickness, the latter caused bullets to tumble. Embankments of frozen snow 1 m. thick, of packed snow 2 m. thick, and of loose snow 3 m. thick, were not pierced even at 250 m.

IV. THE EMPLOYMENT OF INFANTRY FIRE.

Infantry fire may produce either a stunning and paralyzing effect on the hostile forces, or it may gradually exhaust, wear out, and consume them. The fire will have a stunning and paralyzing effect when it is suddenly concentrated upon a narrow front, thereby producing fear and terror, provided actual losses are added to this moral effect.

On the other hand, the fire will gradually exhaust, wear out, and destroy the hostile forces when it is distributed for a prolonged period over an extended front. In this case the material losses suffered and the exhaustion of his physical energies may force the conviction on the enemy that he has no longer a chance to gain the victory. This conviction will cause a suspension of all his energies and consequently of his determination to fight.

At **Modder River** (28th November, 1899) the Boers opened fire on the British at 1000 m., although they had intended to hold their fire until the British arrived within 300 m. of the position.*

The miscarriage of the contemplated sudden burst of fire resulted in a fire fight, which tended to destroy gradually the physical and moral powers of the British. The Boers, however, gave this gradually destroying fire a paralyzing effect by concentrating it suddenly and continuously on tactically important targets that were comparatively easy to hit. Minarelli makes the following comments on the attack made by the British 9th Brigade and Brigade of Guards at **Modder River**: "All further attempts to induce the Guards to advance had to be abandoned. For hours they lay on the dearly bought ground under a blistering African sun, utilizing as cover every ant hill, every tuft of grass, on the apparently deserted battlefield, and being morally certain that to get up would draw a deadly hail of shot." In regard to the fight of the 9th Brigade, the same author states: "Meantime the 9th Brigade fared no better. It had in part been able to get a little closer to the enemy (550 to 900 m.), but was then unable to advance farther. The actual losses were very small in the ten-

*General MINARELLI-FITZGERALD, *Die Gefechte in Natal und der Kap-Kolonie*, 1899.

hour fight, amounting only to seven per cent. The Highland Brigade, surprised at **Magersfontain,** fared still worse. The fight growing out of the surprise lasted almost ten hours. At the short range at which this action was fought, the Boer method of fire (*i.e.,* to fire only when an enemy raised himself to get better aim, and then to employ only an effective concentrated fire) necessarily produced a depressing effect."

In order that such a fire effect may be obtained, it is necessary that the individual soldier combine coolness and presence of mind with good marksmanship, and that company, platoon and squad leaders maintain fire control and fire direction.

1. FIRE DISCIPLINE.

Fire discipline is indispensable to fire control and fire direction. It embraces the conscientious execution of all orders and signals, as well as the scrupulous observation of all regulations bearing on the handling of the rifle and on combat in general. Fire discipline must be maintained even though the fire control and fire direction exercised by the leaders is imperfect or ceases entirely in the course of the action.

Fire discipline requires:

Perseverance under hostile fire, even when that fire cannot be returned; constant attention to the orders of the leaders, and careful observation of the enemy. It requires further, taking advantage of the ground; care in setting the sight and in delivery of fire; an increase of fire by individuals whenever the targets become more favorable, and a cessation of fire when the enemy disappears; finally, economy of ammunition.

The decision is prepared by the fire of infantry, supported by machine guns, field, and heavy artillery. The fire of troops pushed to within short range of the hostile position will in many cases suffice to induce the enemy to give way, so that the assault encounters nothing but evacuated or feebly defended works. The Boer war and the Russo-Japanese war

demonstrate that determined troops will hold a position until the attacker has massed sufficient troops to charge, or at least until he threatens to attack with the bayonet. Examples: Terrayama, on October 11th, 1904. Assault made by the 2nd Division on March 1st, 1905, at Mukden, on Redouts 17 and 18.

Training in bayonet fencing has by no means lost importance, irrespective of the fact as to whether or not bayonets will ever be crossed in future. "Bayonet fencing is one of the most important means of strengthening the moral force of the individual soldier; of developing in him energy, initiative, and courage for making a dashing advance."*

Since the armament of the different armies is almost the same, good individual marksmanship, coolness, fire control and fire direction, and firmly rooted fire discipline, are the deciding factors in an action in which two equal skirmish lines contend for the superiority of fire.

2. FIRE CONTROL AND FIRE DIRECTION.

The principal object of fire control and fire direction is to bring about a superiority of fire at the decisive point by suddenly concentrating the fire of a large number of rifles upon it. This is the only way in which a moral effect may be produced on the troops against whom the fire is directed, while, at the same time, their losses attain such proportions as to become unbearable. At mid and long ranges, the efficacy of fire depends more on fire control and fire direction than upon good individual marksmanship.† Whenever the appropriate rear

*_Introduction to German Bayonet Fencing Regulations._

†See ROHNE, _Schiesslehre für die Infanterie_, 3rd Edition, p. 85. "The importance of the line shot (_i. e._, a hit on the vertical stripe through the center of the German bull's-eye target) in the marksmanship training of the soldier should by no means be underestimated, but rather appreciated at its true value. The line shot forms the basis of known distance firing, just as the latter forms the basis of field firing. Instruction in line shooting (_i. e._, hitting the vertical stripe of the German bull's-eye target) becomes a moral factor of the highest value in field firing. It cannot be denied, however, that the importance of the line shot, as such, decreases with the range. Likewise all attempts to transfer the zone of the line shot from short to long ranges have completely failed." Captain KRAUSE, _Die Gestaltung der Geschossgarbe der Infanterie_, Berlin, 1904, p. 1.

sight elevation is not used, the densest portion of the cone of dispersion will not strike the target, and the chances of its hitting the target diminish as the error in estimating the range and the standard of excellence of the marksmanship increase.

Fire control and fire direction lie in the hands of platoon commanders,* who regulate the fire as their judgment dictates. Fire control and direction embrace: the opening and cessation of fire; the designation of a target and of the elevation to be used; the kind of fire and its distribution; the number of rounds to be fired, and the observation of the effect of the fire. As a rule, the fire will be distributed over the whole front, but portions of the hostile line that are not clearly visible should by no means be neglected (distribution of fire). Regulations prescribing the scope of authority of individual leaders are not considered desirable. The platoon commander possesses in his squad leaders a medium for communicating with his platoon. (Pars. 162—165 German I. D. R.). The movements of the skirmishers, the correct *comprehension of the target,* the *distribution of fire,* the *rate of fire,* and the *employment of the terrain to the best advantage,* are regulated through the squad leaders. The lack of thoroughly drilled cooperation on the part of squad leaders inevitably results, as might be expected, in a so-called "skirmish mob." The platoon commander cannot communicate directly with every individual man of his platoon, but he can control his platoon through his eight squad leaders, who, by reason of their position in the line, can exert the proper influence on their skirmishers.†

*The *Belgian Firing Regulations* require that the officer directing and controlling the fire fight be able to determine: 1. The time necessary to produce a certain effect with a given number of rifles; 2. The number of rounds necessary to produce a certain effect in a given period of time; 3. Whether a given target justifies the expenditure of ammunition in view of the situation or the efficacy of the fire. The requirements of the *Italian Firing Regulations* are similar.

†Austria: The position of the platoon leader is not so definitely fixed as in Germany; neither is it prescribed that squad leaders participate in the firing. In skirmish line fire control and fire direction are to remain as long as possible in the hands of the company commander. The battalion commander is charged with concentrating and distributing the fire; with reinforcing, at the proper time, the companies in the firing line; and with replenishing the ammunition. At long ranges he designates the companies that are to fire, and also the position from which fire is to be opened.

The squad leaders are charged with *constantly supervising* the setting of sights; the distribution, the careful delivery, and the rate of fire; and the expenditure of ammunition.

The squad leaders participate in the firing only when their duties as leaders permit; and this will frequently be the case in a prolonged engagement in the same position, especially at short ranges. These remarks apply also to the range finders.

In Italy and Switzerland the squad leaders participate in the firing when the whole platoon is engaged in a fire fight. The advantage of thus gaining a few better shots for the firing line is more than offset by the more careful supervision of the skirmishers as is required in Germany, France and Austria. The platoon leader unaided is in no position to supervise the proper use of the rifle and the expenditure of ammunition; his subordinates must assist him. It is also desirable to relieve the company commander from the actual duty of fire direction and fire control. The company commander is responsible for leading the company on the battlefield; this does not preclude his thoroughly supervising his platoons and observing the effect of their fire.

"Whenever the company commander is in the firing line, he selects and designates the target and gives orders for opening fire. He announces the range found by the range finders and observes the effect of the fire. Aside from this, he leaves fire control and fire direction to his platoon commanders, and interferes only when he desires to concentrate the fire of several platoons, or of the whole company, on a certain target, or when he observes something that has escaped the notice of the platoon commanders." (Par. 216 German I. D. R.).

In the course of an action, fire control and fire direction will frequently be imperfect, whether this be due to the loss of the leaders, or to the difficulty of hearing commands in the noise of the combat. To provide for such contingencies,

the skirmishers must be taught that, in the absence of fire control and fire direction, they may fire (*not that they must fire*) at all targets within 600 m.; that between 600 and 1200 m., they should fire at tall and wide targets only; and that, at ranges over 1000 m., as a rule, they should not fire at all.

In the pamphlet entitled, *Actual Experiences in the Russo-Japanese War*, p. 11, et seq., Captain SOLOVIEV, 34th East Siberian Rifle Regiment, Ist Siberian Corps, states: "* * * There was an almost ungovernable tendency among the men, as soon as they had thrown themselves down, to open fire without orders; paying attention neither to the target designated, nor to setting their sights.

"This haste is, first of all, brought about by the desire of drowning the consciousness of danger by means of increased activity. * * * It is simply impossible to control and direct the fire when the men have not been carefully trained. The din of battle, the explosion of hostile projectiles, and the thunder of our own artillery make such a deafening roar that one can scarcely hear one's own voice. The long firing lines make it extraordinarily difficult to transmit orders; even squad commanders can not make themselves understood. Volley firing must therefore be dispensed with.

"Only whistle signals, if repeated by all non-commissioned officers, can be heard; but the men must be trained to obey the whistle signal. With strictness and application much can be accomplished in this direction; it may even be possible to stop the firing along the whole length of the deployed company in the hottest phases of the fight.

"The difficulties of fire control and fire direction increase in proportion to the intensity of the hostile fire and the proximity of the enemy, especially on the defensive. The men get more and more restless, their nervous tension increases, the danger seems nearer and greater. In such a moment the leader must make every effort to keep his men in hand, and prevent the firing from degenerating into a wild blazing away at nothing. This is always a sign that the leader has lost control of his troops.

"The greatest obstacle to good fire control and fire direction is the nervousness that usually pervades troops which are not accustomed to active service. Only thorough peace training and strict fire discipline ensure the maintenance of order in battle and give the fire the necessary efficacy. * * * The more laborious the struggle, the more embittered the fight, the greater the losses, the more fatigue and nervous strain gain the upper hand, the greater and more important the role which the officer has to play. The success of the 200 men under his command depends entirely upon the company commander. The war in the Far East might well be called the war of company commanders. The soldiers watch their leader constantly and attentively. Two hundred lives depend upon his bearing, his determination, firmness, and personal bravery. The men judge

the situation, the imminence of danger, success and failure, by the conduct of their leader. The authority of an officer may rise to great heights, but it may also sink very low. To show depression or faint-heartedness is fatal; the feeling of despondency is at once communicated to the men, the leader loses control of his command, and the mischief is done.

"In battle, more than anywhere else, the officer must be a commander and rule with an iron hand. Nowhere does discipline play as great a role as in action. Woe to the troops who have not in time of peace become thoroughly disciplined, to whom discipline has not become second nature! They will pay dearly for this deficiency in war.

"I have observed that in the most critical situations a resolute shout, in a correspondingly imperious tone, had a marvelously quieting effect upon the men. It is likewise advisable to make, here and there, a remark concerning routine duty. For example: 'Why have the sights not been set in that platoon? Platoon commander, see at once that it is done.' Because the commander is angry, and notices neglect, everything goes well, so the men reason, and no danger need be apprehended. The men quiet down, forget the whistling of the bullets, set their sights carefully, point their pieces properly, and aim again."

3. SELECTION OF THE LINE TO BE OCCUPIED.

While a good field of fire is indispensable for reaping the maximum benefit from the power of our rifles, the tactical situation is the determining factor in the choice of a position. The requirements as to a field of fire and the use to be made of it will vary, depending upon whether it is desired to avoid an engagement at short range (delaying action) or whether a decision is to be sought (decisive action). In the first case a free field of fire at short ranges may be dispensed with.

Cover may be used only to the extent that it does not interfere with constant observation of the enemy. It is not permissible to hide entirely behind cover, unless expressly ordered in each case. To rise from behind cover, for the purpose of firing, and to disappear subsequently behind that cover for loading, is out of the question in the firing line. This is physically impossible and much less attainable for psychological reasons; in addition, the skirmisher will present a much larger target than when lying down. When portions of the firing line cannot see the target during an attack, the

platoon commander should consider this a hint, either to gain a better position farther to the front, or to suspend his fire temporarily. (Par. 190 German I. D. R.). In defense, in a similar case, cross fire would frequently be the proper expedient. While the defenders who must fire kneeling in order to sweep the foreground, will often present nothing but head targets to the attacker's view, they will offer targets of half a man's height to his bullets. Since smokeless powder is employed, it is important to select positions that cannot easily be found by the enemy. Positions in which the skirmishers are silhouetted against the sky line should be avoided whenever possible. Faintly illuminated targets, or those lying in the shade, are not fired on at all, according to all experience, while the fire is above all else directed against sharply outlined targets. The leaders must take to cover also, for in many cases single officers standing upright draw attention to the position. The extent of the position must be commensurate with the strength of the force; too dense a line reduces the efficacy of fire and increases the losses, while, on the other hand, too dispersed a force increases the difficulties of fire control and fire direction.

4. THE STRENGTH OF THE FIRING LINE.

This depends upon the purpose of the action. Although a thin firing line may be employed when the situation is still in doubt (protection against surprise), it must be strong when the superiority of fire is to be attained. If the firing line is made too weak, we are condemned to fight a superior force continuously with an inferior one because we have voluntarily sacrificed the advantage of our numerical superiority. On the defensive, as soon as the direction of the hostile attack develops, the firing line is made as strong as seems necessary for holding the position. In a delaying action, however, we should endeavor to place as few men in action as possible; and to compensate for the lack of rifles by an increased expenditure of ammunition. All firing is done from the prone position, in so far as the ground permits. The French attempt

to regulate the volume of fire by prescribing the number of rifles to be employed instead of designating the kind of fire to be used.

In Switzerland and England,* it is recommended that supports use "Fire of position" where the terrain is suitable (hilly country). The German Infantry Drill Regulations (par. 340) contain a similar provision. When the supports cannot see the firing line on account of the conformation of the ground, this fire is not likely to endanger the latter.

5. ASCERTAINING RANGES.

(Pars. 78—98, 190 and 191 German I. F. R.).

Efficacy of fire depends upon a knowledge of the range. An imperfect knowledge of the range may be compensated for by the flatness of the trajectory of the individual rifle and by the favorable conformation of the ground in respect to the cone of dispersion. In collective fire, at mid and long ranges, each rear sight graduation commands a beaten zone approximately 100 m. deep—good aim, proper elevation, and careful firing being presupposed. The nearer the target is to the densest portion of the cone of dispersion, the greater the efficacy of the fire.

The following results were obtained in Italian firing tests in which 100 skirmishers fired at a plate 1 m. high and 30 m. wide with the 6.5 mm. rifle:

	MEASURED RANGE.		ESTIMATED RANGE.	
	Slow fire†	Rapid fire†	Slow fire†	Rapid fire†
	Percentage of hits.	Percentage of hits.	Percentage of hits.	Percentage of hits.
At 500 m.	21.5	15.8	14.8	11.3
At 1000 m.	11.1	8.1	6.5	5.3
At 1500 m.	5.	3.4	2.6	2.2
Average results at—				
Ranges under 1000 m.	18.2	13.6	12.1	9.3
Ranges over 1000 m.	7.1	5.1	3.2	3.2

*_Infantry Training_, 1905, p. 132, par. 2; p. 134, pars. 1, 2; p. 136, par. 6; p. 155, par 1. See p. 154, infra.

†Slow fire four shots, rapid fire fourteen shots, per minute.

Beyond 600 m., an error in the range exerts a greater influence upon the efficacy of fire than does the marksmanship of the skirmishers.* When an improper elevation has been selected, the efficacy of the fire decreases as the compactness of the "cone of dispersion" increases; in other words, the efficacy of the fire decreases as the excellence of the marksmanship of the men and their coolness in the face of the enemy increase. (See pp. 170 and 171, infra).

The following expedients for ascertaining ranges may be mentioned:

(*a*) Pacing and galloping;

(*b*) Estimating distances on the ground by eye (by comparison with known distances; by estimating part of the distance);

(*c*) Firing trial volleys (ranging);

(*d*) Taking the range from a map of large scale or obtaining it directly from infantry or artillery already engaged;

(*e*) Measuring the range directly on the ground.

Pacing (employed in Russia, France, and Austria) gives inaccurate results. There is a difference between the number of paces a man takes per 100 m., on a chaussee and in a ploughed field. Length of pace depends upon the character and slope of the ground.† In pacing over varied ground, a man follows the slope line while the projectile follows an air-line. Therefore it would seem that pacing is only practicable at short ranges when the enemy is not near. The same is true of galloping over the distance. (The length of a horse's jump at a gallop is on an average 3 m.).

In estimates made by individual men, the error amounts

*ROHNE, *Das Gefechtsmässige Abteilungsschiessen der Infanterie*, p. 13.

†Professor RZIHA ascertained the following diminution of the length of a pace at different degrees of slope:

Descending slope, degrees	0	5	10	15	20	25	30
Length of pace in cm	77	70	62	56	50	45	30
Number of paces per 100 m	129	143	161	179	200	222	333
Ascending slope, degrees	0	5	10	15	20	25	30
Length of pace in cm	77	74	72	70	67	60	50
Number of paces per 100 m	120	135	138	143	148	166	200

According to Major CZERNY, Austrian Army (*Treffwahrscheinlichkeit*, in *Streffleur*, 1906, II), the error may be as much as 16 per cent of the range.

approximately to one-eighth (12.5%) of the range;* this may be corrected by taking the mean of a considerable number of estimates, or by employing combined sights at ranges over 1000 m. (the difference between rear sight elevations being 100 to 200 m.), thus increasing the depth of the beaten zone. The accuracy of the resulting fire is influenced by local and atmospheric conditions. (Par. 80 German I. F. R.). Estimates usually fall short of the correct distance when made in bright sunlight; in clear atmosphere; when the sun is in rear of the man estimating; when made over uniform surfaces; over water; when the target is set off by a bright background; when made over rolling ground, especially when the several depressions cannot be seen. On the other hand, estimates frequently exceed the correct range when made in a flickering light; against a dark background; against the sun; when the sky is overcast; during foggy weather; in the dusk, in woods; and against an enemy who is only partially visible. According to the Swiss Firing Regulations (1906) estimates made from a height downward are usually too short, and those made from low ground up, too great.

In action, under the influence of danger, estimates are usually short.† Peace training proves that the skill of the

*Lieutenant-General ROHNE, *Das Gefechtsmässige Abteilungsschiessen der Infanterie*, 4th Edition, p. 12.

The following statement is taken from a report made at the British Musketry School at Hythe (5th Nov., 1905). In a great number of estimates under 700 yards (630 m.) the results given below were obtained:

		Error		Greater
	Correct	±50 yards	±100 yards	errors
Officers of the Regular Army.....15		49	20	14%
Officers of Militia and Volunteers....20		44	22	20%

France: Officers made errors of 20% at the beginning of the period of instruction, 12% at its close; rank and file of the Regular Army and non-commissioned officers of the Reserve made errors of 30%.

†The advance of the IInd Battalion of the 2nd Hessian Regiment on August 18th, 1870, from the Bois de la Cusse against the height northwest of Amanweiler: "The companies, who supposed the enemy to be much nearer" (the actual range was 1,100 to 1,200 m.), "advanced, cheering, and were received with mitrailleuse, shell, and rifle fire (from hill 1,030) which swept the railroad line." HESSERT.

Battle of Plevna, September 11th, 1877. Debouchment from corn fields: "The distance still to be crossed before the Turkish works were reached was underestimated. One company cheered when at a distance of 900 to 1,000 paces from the hostile works; the other troops took up the cry and rushed forward at a run." KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg.*"

majority of soldiers in estimating distances can be improved only up to a certain point.

Germany. All the men are practiced in estimating distances up to 800 m. Officers, non-commissioned officers and suitable men (range finders) are to be trained in quickly and accurately estimating mid ranges, and practiced in ascertaining long ranges. (Par. 78 German I. F. R.).

"Even a skillful range finder, if he is conscientious, can do no more than give a minimum and a maximum estimate of what he considers the range to be. The ranges must be communicated to the men accordingly. The differences between maximum and minimum estimates should be as follows: At ranges up to and including 500 m., 100 m. (for example: 350—450, or 500—600 m.); between 500 and including 1000 m., 200 m.; over 1000 m., 300 m."

Italy. Subalterns are, as a general rule, charged with estimating the ranges. Non-commissioned officers must be able to estimate ranges up to 1000 m. All non-commissioned officers as well as suitable privates participate in estimating distance drill, which is conducted by an officer in each battalion. The results are recorded in a book. The following is the classification:

Excellent range finders: Those whose error rarely exceeds 50 and never 100 m.

Good range finders: Those whose error does not exceed 100 m., and in exceptional cases 150 m.

Fair range finders: Those whose normal error does not exceed 150 and never 200 m.

Poor range finders: Those whose error exceeds 200 m.

The **Russians** estimate only short ranges, as a rule; the longer ranges are determined by means of range finding instruments. In the first year of their service all the men are drilled in estimating ranges from 400 to 800 paces; officers and twenty specially selected men from each company up to 3000 paces. The latter (both officers and men) are to make at least 36 estimates in nine days. (Par. 190 Russian I. F. R.). The result is considered good when the error in the estimate does not exceed the figure given below at the ranges named:

Range in paces.	Error in paces.	Percentage of error.
400 to 1000 paces	50 or	12.5 to 5 %
1000 " 2000 "	100 "	10 " 5 "
2000 " 3000 "	200 "	10 " 6.6"

The Russian range finding instrument (*Souchier*) is used by officers and specially trained non-commissioned officers; errors in determining ranges are not to exceed a maximum of 2—3 per cent.

In **Switzerland** recruits are trained to estimate distances up to 600 m. and specially skilled men up to 1500 m.; all non-commissioned officers

estimate ranges up to 1000 m. and officers up to 1500 m. Three weeks after the recruits join, those of the most skilled in estimating distances—about an eighth of the total number—are selected to undergo further instruction. For this purpose they are placed under the orders of an officer charged with this instruction, who trains them for at least three hours, every other day, in estimating distances on varied ground. The better half of these men, regardless of the company to which they may belong, receive further instruction. Exercises on wholly unknown terrain are to be had with these men and not only extended marches but even railway journeys not exceeding 30 km. are authorized for this purpose.

In **Austria** the men are required to estimate distances up to 800 paces (600 m.), i. e., up to the range within which they might frequently have to choose their target independently. Only officers, non-commissioned officers, and specially skilled men are required to estimate ranges up to 2000 paces (1500 m.). The mean error of twenty determinations at short, mid, and long ranges, of a "reliable range finder," is not to exceed 12 per cent. The *Roksandic* range finding apparatus is said to give errors not exceeding 2—3 per cent when skillfully used.

To memorize distinguishing marks on the enemy as an aid in arriving at a correct estimate of the range, is not considered as simulating actual service conditions, since the power of vision of the men differs. Furthermore, one sees the enemy mostly in a prone position in action, and it is not to be expected that the men will remember the various rules for determining the range by the appearance of the enemy's skirmishers. The same is true of the regulation which prescribes that the soldier estimating the range is to judge the effect which the target makes upon him. (England and Austria).

It will rarely be practicable for infantry to scale the range directly from a map. Infantry ranges are usually so short, in comparison to the scale of most of the maps, especially those available in the field, that it is difficult to take them between the points of a pair of dividers. Moreover, in an infantry action conspicuous objects are not likely to be located often enough near the position of the skirmishers to make it practicable to find them quickly even on the most accurate maps. The artillery is much better off in this direction; its ranges are longer and therefore more easily scaled from a

map. Moreover, artillery is generally posted on or near prominent points, which may be found on almost any map. It should be remembered that a map is a horizontal projection, that any range scaled from a map is the base of a right triangle, and that the line of sight of a rifle, when firing uphill, follows the hypotenuse of that triangle.

An accurate knowledge of the range to within a meter is not necessary, as meteorological conditions,* especially temperature and illumination (degree of humidity of the atmosphere) affect the range of the projectile. Meteorological conditions may necessitate sight corrections amounting to 100 m. at mid ranges and to 150 m. at long ranges. According to the French Firing Regulations a difference of temperature of ±10 degrees C., changes the range of the Lebel rifle by 18 m. at 1000 m. The altitude of the terrain increases the range on account of reduced barometric pressure; this becomes a factor in the selection of a rear sight elevation at an altitude of approximately 1000 m. According to the French Firing Regulations, the range of their rifle at 1000 m. is increased as follows: At an altitude of 500 m. by 18; at 1000 m. by 42; at 1500 m. by 63; and at 2100 m. by 89 m.

These meteorological influences can be eliminated by obtaining the range from troops already engaged (artillery) or by determining the proper rear sight elevation (not the range) by trial volleys (pars. 190 and 191 German I. F. R.) or by an animated fire at will (Switzerland: fire at will, one round).

To ascertain the range by firing trial volleys is, however, practicable only when the terrain near the target is visible; when the target itself is stationary; when the ground is such that the strike of the bullets can be observed; when the firing party is not under fire; and, finally, when the necessary time is available. Since all of these preliminary conditions will

*Lieutenant-General ROHNE, *Schiesslehre für die Infanterie*, p. 51, and also par. 70 Austrian I. F. R. The effect of temperature and of the altitude of the battlefield was strikingly illustrated in the Boer war.

rarely be fulfilled, it will only in exceptional cases be possible to determine the proper elevation by this method.

When this method is employed, volleys are fired either by sections or by platoons, with the same sight, at some one point of the target. For the first volley a rear sight elevation sufficiently below the proper one should be selected, so that hits on or in front of the target can be expected with certainty. This procedure is then repeated, as often as necessary, with correspondingly raised or lowered rear sight leaves, until the correct elevation is obtained.

This "ranging" by trial volleys promises no result, however, if any one of the above-mentioned preliminary conditions is not fulfilled. It is advantageous to establish a bracket by firing volleys, as is done by artillery, but even with a good glass it is very difficult to observe the strike of small caliber bullets. Whether it would be advisable to adopt for this ranging a specially designed weapon, firing thin-walled shell weighing about 400 g., is a question.*

The older range finding instruments depend upon angle measurements at both ends of a line (up to 25 m. long). The large range finder (*Hahn*) has been adopted in the German army. (Pars. 88—98 German I. F. R.). This apparatus permits a range to be measured from one point, up to 1200 m. on low targets, and on taller targets, such as skirmishers standing, up to 1600 m. Measurements are considered sufficiently accurate when the error amounts to

2—3% up to a range of 1000 m.
3½—5% " " " " 2000 "
3—3½% " " " " 1500 "

On the defensive the large range finders will find employment before and during the action. The men charged with the measurement of the range should be careful not to betray the position by their activity, before fire is opened. The utility of these instruments is much more restricted in an attack. However, it will often be possible, before the fire

*The 32 mm. *Nordenfeld* machine gun fires a shell weighing 400 g.

fight begins, to ascertain the range from the point selected for the first firing position, to the position to be attacked. According to Soloviev range finders failed completely in action in Manchuria. (See p. 137 supra).

6. SELECTION OF A TARGET AND TIME FOR OPENING FIRE.

In selecting a target and opening fire it must be remembered that the fire cannot have a decisive effect unless the target is well within effective range. The leader should ask himself whether the result to be expected is properly commensurate with the probable expenditure of ammunition entailed, and whether this expenditure is warranted in view of the total amount available. But the decision to fire upon a target once made, the ammunition necessary for the attainment of the object of the fight must be expended without stinting, since all experience teaches us that an ineffective fire impairs the morale of one's own troops, while it raises that of the enemy.

In the selection of a target, its tactical importance is the principal determining factor. The fire is first directed upon the most dangerous, generally the nearest target, or the one which is soon to become the most dangerous. Subsequently the fire should be directed upon targets which, owing to their height, width, depth, and density, promise the greatest number of effective hits.

Infantry will, as a rule, offer the most important and promising target, and the fire should be directed against the firing line, since the troops following it in close order will in any event come within range during their advance. In Italy, when two targets are available, the fire is to be directed on the one promising the best results.

Ballistic and tactical considerations determine whether fire should be opened at long or at short ranges.

Adequate results may be expected when the fire is directed against low targets at ranges of 800—1200 m., but at ranges

over 1200 m. a decisive effect is only attainable by the expenditure of a large amount of ammunition. Skirmishers standing may be fired on with good effect even at ranges over 1200 m. (long ranges).

When the fire is properly controlled and directed, it will be effective against tall and deep targets within ranges corresponding to the highest graduations of the rear sight leaves. However, when the targets are narrow, a side wind is very apt to throw the cone of dispersion off the target.

The idea of using our accurate, long range rifle at long ranges in defense, thus bringing it into effective play, at a time when the danger to our own troops is still very small, is, at first glance, very tempting. Military history shows that such fire was successful here and there, especially where one of the contending parties was armed with a much superior weapon, or where the enemy failed to apply the proper remedy. But even in these cases it was successful only up to a certain point. There is this to be said against employing long range fire: Its effect is insignificant when compared with the expenditure of ammunition entailed; it is difficult to replenish ammunition and it tires the eye and the arm of the skirmisher. Poorly trained troops finally do not raise their rifles at all, but blaze away without aiming. To be sure, fire opened at an early moment annoys the advance of the enemy, but it cannot seriously retard it. Once the fire is opened, we want it to be effective; we don't want to injure the enemy—we want to annihilate him.

Although we fully appreciate the good results obtained at long ranges on the target range, we prefer to utilize the entire staggering fire effect of our weapons at short and mid ranges, wholly for the purpose of annihilating the enemy.

Since only small targets, often scarcely discernible by the naked eye, present themselves to the attacker, the fire of the defender should not be returned at once. The forward movement should be continued by utilizing every expedient

(rushes with breathing spells, and cover) until serious losses are sustained and the leader has reason to fear that his men will lose their morale and throw themselves down without orders. Frequently several groups will open fire while the others continue to advance. The endeavor should be to open fire only when the attacking force has gotten as close as possible to the lower limit of mid combat range (800—1200 m.).*

Errors in estimating the range are offset by the flat trajectory of the rifle only at short ranges, and only at these ranges can there be any question of an effective preparation of the attack by fire. These views are expressed in the German regulations.

Recent wars demonstrate that, whenever the attacker opened fire at long ranges, the attack finally came to a standstill, that the troops in many cases fired away all their ammunition, and that the whole attack failed.

"Whenever the attacking regiment opened fire this was unfortunately a sign that the attack had been repulsed." This remark made by Kuropatkin in regard to the fight of the Russian infantry (center group) on Sept. 11th, 1877, at **Plevna,** is characteristic of the Russian ideas. On the occasion referred to, the Russians advanced on the Turkish works without fire preparation; the firing lines halted 400 to 600 m. from the Turkish position and commenced firing. They succumbed because it never occurred to the leaders to reinforce them and attempt to gain a superiority of fire. Even in Skobeleff's attack there was no sign of actual fire preparation, but, as soon as the line halted, strong reinforcements were pushed in to carry it forward. The attack, made on a front of about 800 m., suffered heavy losses, but succeeded, although all organizations were in complete disorder. After advancing 1000 m., the decimated first line (8 battalions) halted; fifteen fresh companies carried it forward some 150 m.; then Skobeleff threw in twenty companies in one body, which carried the line forward to within approximately 100 to 150 m. of the work. At this moment Skobeleff threw himself into the fight and succeeded in taking the Turkish position with his badly cut up troops. Doubtless an act of undeniable gallantry, but not one worthy of imitation.

*At Paardeberg (18th March, 1900), the left wing of the Highland Brigade advanced, without firing a shot, to within 450 m. of the hostile position. This advance, to be sure, was made under cover of the fire of the right wing of the 9th Brigade, which had made a lodgment within 750 m. of the enemy's position.

The war between Servia and Bulgaria (1885) is very instructive in this connection. As in 1859, 1870 and 1877, that force was defeated, which, trusting to the superiority of its rifles, opened fire at long ranges. The Servian skirmishers often did not even get within decisive range of the position of their opponents.

The British infantry, armed with a long range rifle equipped with an excellent rear sight arrangement, allowed itself to be enticed, by the long range fire of the Boers, into opening fire at 1200 and 1300 m. (Guard at Modder River) and even at 1600 and 1700 m. (6th Division at Paardeberg) against an enemy whose position was not discernible even through the most powerful glasses. The losses were small and not to be compared with those which our Guard suffered without firing, during their advance on St. Privat. The advance of the Gordon Highlanders at Doornkop (29th May, 1900) to within short range of the hostile position, without firing a shot, although they themselves were under fire from 2000 m. on, was splendid.*

Since the assailant presents larger targets than the defender, and the latter can make preparations for firing, ascertain ranges, construct riflerests, and replenish ammunition without difficulty, it is proper in defense to open fire at long ranges, especially in delaying actions, for then fighting at short ranges is to be avoided in any case. It is absolutely correct for the defender to make the most of the advantages above mentioned. While everything is orderly and in readiness in the defender's firing line, the attacker's line is still in the process of forming. Should the defender wait until the hostile firing line has systematically deployed and has made a lodgment within short range of his position, or should he produce losses and create confusion in its ranks by suddenly opening fire?

The employment of long range fire on the defensive is justified when sufficient ammunition is available, when artillery is not present, and when the hostile infantry pursues the tactics of advancing to short range without firing. "Infantry

*The Times History of the War in South Africa, IV, p. 141.

should never attempt to take the place of artillery at long ranges or compete with the fire of that arm." If it is important for the attacker to reach the extreme limit of mid ranges with as little firing as possible, the defender should in the first place fire on him with artillery, and, when this does not suffice or is not available, with infantry, so as to prevent him from accomplishing his object.

At mid ranges the efficacy of the defender's fire is so great, when directed upon an infantry line advancing without fire support, that it becomes an important factor. At ranges from 1000 to 600 m., 8 to 25% hits can be counted on when the fire is directed against advancing skirmishers; and even assuming an error of 1/8 in the estimated range, 3 to 12% hits may still be expected. (Par. 623, p. 196, German I. F. R.).

If the attacker is unable to hide from the defender's fire by using cover, his losses will increase until they become unbearable; his attack will hesitate, and he will commence firing. Fresh troops are necessary to carry the attacking line forward anew. The success of the defense is assured, if the defender is able to prevent the attacking force from getting within short range of the position. The defender's chance of making a successful counter-attack disappears, however, as soon as the attacking force makes a lodgment within short range of the position; for the closer the defender is pressed, the closer will he be tied to his position. While the superiority of fire enjoyed by the defender at mid ranges allows him perfect freedom of action, at short ranges the attacker's fire imposes conditions upon the defense which make the growing power of the attack sensibly felt. The moment the defender begins firing, however, he becomes at once a favorable target for the artillery of the attacking force. The defender frequently betrays his position prematurely by opening fire.

The *moral effect* of withholding the fire (*fire surprise*) is very great.* A strong fire will be actually annihilating if

*Marshal BUGEAUD gives a very graphic description of the moral effect of fire in his *Aperçus sur quelques détails de guerre*, based upon his experiences in the fights with the British in the Peninsula: "The men began to get excited

suddenly directed upon the enemy at short ranges, especially if he is still in unsuitable formations, owing to his ignorance of the defender's position. (Example: The British brigade under Hart at Colenso, 15th Dec., 1899, and the Highland Brigade at Magersfontain, 11th Dec., 1899) or if the morale of his troops is questionable.* What good troops should do in such a situation (employ rapid fire and then advance to the assault) is shown by the conduct of the IInd Battalion of the 20th Infantry at Coulomiers.† Steady nerves and iron discipline are, however, prerequisites for the execution of a fire surprise by the defender.

Long range fire was employed with success on the defensive by the French at St. Privat (the Germans suffered the most serious losses at ranges from 1200 to 1000 m.) and by the Turks at Plevna. At 1500 m. the Russian losses were such that they were obliged to begin advancing by rushes. The losses decreased as the enemy's position was approached. The long range fire had produced a retarding but by no means an annihilating effect. On the other hand, the fire of the defender, at extremely short ranges, had a telling effect at

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when still 1,000 m. from the enemy; they talked to each other; the march became more and more hurried; and disorder appeared here and there in the columns. The British remained quietly at order arms; their calm demeanor was not without effect upon our young soldiers. We approached closer, the men shouting: *'Vive l'empéreur! En avant, à la baïonette!'* Shakos were raised upon the points of bayonets; the march became a double time; the ranks became mixed; the excitement caused confusion here and there; and a few shots were fired from the column. The British continued to stand immovable, and seemed to pay no attention to us even when only 300 paces separated the two forces.

"The contrast was apparent. Everyone felt that he would have to deal with an opponent tried in battle; that the fire so long withheld by the enemy would surely be annihilating. Our fighting ardor cooled; the moral power which calmness, even when only apparent, exercises over confusion, which seeks to drown itself in noise, made itself felt in our ranks. At this moment, when the highest tension had been reached the British line raised its rifles—an indescribable feeling rooted many of our men to the spot—and began to fire. The volleys, coolly delivered against a narrow front, plowed through our ranks; we wavered, decimated though we were, in order to recover; then three overpowering cheers from the opponents' line, which rushed forward to the bayonet attack, and everybody turned to seek safety in disorderly flight."

*The defense of the cemetery at Beaune la Rolande. HÖNIG, *Volkskrieg*, pp. 157 to 212.

†Dec. 15th, 1870. *Geschichte des Regiments Nr. 20*, p. 246. KORTZFLEISCH, *Feldzug gegen den Loir*, p. 81.

Beaune la Rolande; in the defense of Chagey on the Lisaine;* in the defense of Shipka Pass (200 to 300 paces) by the Russians, and in the engagement at Gorni Bugarov (1st Jan., 1878). Whenever the attacker enters the short range zone while still in unsuitable formations, his losses increase until they become annihilating. (Example: The bayonet attacks made by the Austrians at Nachod and Trautenau).†

Provisions of Various Regulations.

Austria. *"In attack, everything must be done to get as close as possible to the enemy before fire is opened."* In each fire position the fire should be delivered with steadiness and without haste.

In *defense,* fire is to be opened as soon as appropriate targets appear within effective range. Sometimes—especially in minor operations—it may be advantageous to let the enemy come up close and then open fire on him suddenly.

A decisive fire effect can only be counted on when the targets are situated within effective range. Ineffective fire is a waste of ammunition which impairs the morale of one's own troops and raises that of the enemy. For firing at long ranges it is necessary to consider whether a sufficient amount of ammunition is available. Long range fire should, in any case, be used only when the size of the target makes an adequate fire effect probable, and when the range is known, or can be ascertained with accuracy. In long range fire the use of small units, each expending a large amount of ammunition, is as a rule to be recommended. The *distribution* and *concentration* of fire should be regulated by the officer charged with fire direction.

"Effective fire, delivered suddenly, especially when taking an enemy in flank or in reverse, even when delivered only by relatively small forces, shakes the morale of the enemy in the most effective manner." (Fire surprise). "Under certain circumstances, but especially when the enemy has used up all, or nearly all, of his reserves, comparatively small detachments, skillfully led, can contribute materially to success, or even bring about the decision, if they are able to get on the enemy's flank or rear

*KUNZ, *Entscheidungskämpfe des Korps Werder,* II, pp. 53, 93 and 143. The village was situated in a valley and had only a limited field of fire.

†KÜHNS, *Kritische Wanderungen,* I, pp. 73 and 139; III, pp. 86 and 113. As regards flatness of trajectory and accuracy, the power of the needle gun (*Zündnadelgewehr*) at point blank range (280 m.) corresponds to the effect of rifle model '98 at approximately 800 to 900 m. At Nachod the regiments named below suffered in two hours the losses given:

Regiment.	Strength; men.	Loss, men; prisoners included.	Prisoners.	Percentage.
20th Infantry.	2,500	722	165	28.8%
60th Infantry.	2,500	685	185	27.4%

and open fire on him suddenly at short range." Such fire surprises should be attempted when the conditions essential for their success are present.*

France. In *attack,* fire is opened as late as possible, at any rate not until the losses make it necessary to discontinue the forward movement. Fire is the only means which makes a further advance possible.

In *defense,* long range fire may be used under certain circumstances. "Sudden and violent rafales delivered at short range take the attacker by surprise if, all at once, he loses a great many men."

England (1905). *Attack.* Infantry is to advance as close as possible to the enemy before opening fire; small losses must be endured. Fire is decisive under 540 m. (600 yds.). Artillery and infantry should support each other. Attention is called to the support afforded advancing skirmishers by the fire of infantry units and machine guns held in rear. The British are thus the first to prescribe "fire of position." Their Firing Regulations require that "fire of position" be practiced by company at a range of 900 m. The company forms line of skirmishers (2-pace intervals) while movable disappearing targets are placed opposite it. The fire is to increase in intensity when the attacking infantry advances over level ground or finds obstacles; it is discontinued when cover is reached. "Fire of position" is not without danger, but seems to be practicable occasionally. Aside from its employment in "fire of position," long range fire is to be used in attack in the following cases: In enveloping movements for the purpose of enfilading the enemy's line; when favorable targets present themselves; in containing actions or in feints; in concentrated collective fire; and finally in pursuit. *Defense*: Fire is to be opened at 1000 m. on skirmishers, but it may be advantageous to withhold it until the hostile line comes within short range. This will give good results when the enemy is in ignorance of the defender's position, or when the attack is made by poorly disciplined troops. Continued long range fire tires the eye and the hand.

Italy. In *attack,* the firing line is to reach the extreme limit of short range (500 m.) with as little firing as possible; to open fire before this with a part of the advancing force is only permissible when necessary to carry the line forward. *Defense.* As soon as the defender has a chance of obtaining some fire effect, he should open fire to prevent the attacking infantry from getting within short range. Fire at long (up to 1800 m.) and at mid ranges (up to 1000 m.) may also be used for this purpose. The battalion commander determines when fire is to be opened.

From what has been said in the preceding pages as to the time when infantry should open fire, we may deduce the following **General Rules:**—

*In minor operations this would be a proper place for the employment of large scouting detachments, the importance of which decreases with the size of the contending forces. Such tasks can, however, be just as well performed by a well-trained body of infantry.

It is permissible to open fire at an early moment only in exceptional cases when the situation requires it; good preparation, which assures the efficacy of fire and a high moral effect from the very beginning, is of greater importance.

(a) IN ATTACK.

The attacker should advance without firing to ranges at which an adequate fire effect against the low targets presented by the defender may be expected. To open fire at an earlier moment is permissible only when the defender's fire is so strong that effective ranges cannot be reached without firing. Long range fire is only a means to an end. In a pursuit long range fire will, however, be employed for the purpose of annoying the enemy.

(b) IN DEFENSE.*

Fire may be opened at long ranges when sufficient ammunition is available, only when the object is to gain time, and in decisive actions, when the enemy presents favorable targets and we have no artillery. Unless other reasons prevent, fire is opened as soon as targets are clearly discernible and easily brought into line with the sights. It is advisable to withhold the fire when the hostile artillery is superior, when the opponent's troops are of poor quality, and when it is impossible to surprise the enemy with our fire while he is in unsuitable formations. In defense, as in attack, the decision must be sought by the employment of rapid fire at short range.

7. PAUSES IN THE FIRE.†

Swiss Firing Regulations p. 44: "It may be advantageous in defense to fire on the attacker only until he himself opens fire, and then to

*In Manchuria the Russians, when on the defensive, opened fire on favorable targets at 1,500 m.; on skirmish lines at 1,000 m.

†A Russian company commander contributes the following in *Mittellungen der Infanterie Schiessschulen:* "On Sept. 3rd, 1904, the fire in one of the trenches at Liao Yang lasted throughout the entire day. The men were finally completely exhausted; their shoulders, hands and fingers stiff. They had to be given some rest, and something to eat and drink. Then the fire was resumed, only to die down again. The fire of the skirmishers was not very effective, as they were completely exhausted and used up."

remain under cover until he resumes his forward movement. A prompt resumption of the fire by the defender must, however, be assured."

France. "The fire should cease when the hostile infantry halts and takes to cover; its volume is increased as soon as the assailant resumes his forward movement, or when he shows himself in dense formations on open ground."

The efficacy of fire depends upon its accuracy, its direction with reference to the target, and its volume. In the past, pauses in the fire were necessary to allow the powder smoke to clear away; at present they are of advantage because they give the men a breathing spell; rest eyes and nerves; enable ammunition to be distributed, and allow preparations to be made for concerted action. In making use of such pauses good cover, good observation of the enemy and instant readiness for resuming the fire are essential. In a serious engagement the men either maintain a vigorous, animated fire or they rest. If the advancing enemy takes to cover, the fire must cease, only to be resumed with full vigor when favorable targets appear. The attacker (like the British in South Africa advancing against the Boers) will in many cases—especially at the beginning of a campaign—be deceived into believing that the defender has withdrawn; should the attacker now advance, the defender, by suddenly resuming his fire, will surprise him to such an extent that he may be repulsed.* Pauses in the fire are a practical expedient for maintaining fire discipline and enable the leader to keep his troops in hand. An organization is capable of performing its duty well, so long as it obeys the command "cease firing." It might be well at this point to determine when the defender should *change his rear sight elevations* if the attacker advances by rushes. At mid ranges it might be advisable to stop firing, so as to present no target to the enemy when his line throws itself down after a rush, and to utilize this interruption for

*Compare HÖNIG, *Vierundzwanzig Stunden Moltkescher Strategie*, p. 145, relative to the various opinions entertained in the staffs of Generals v. Göben and Steinmetz in regard to the pause in the fire of the French at Point du Jour. *Der 18. August*, pp. 269, 271 and 352.

changing the rear sight elevation. When this is done during a forward rush of the enemy, the rapidity of fire will suffer at the most favorable moment for bringing an effective fire to bear upon the enemy.

8. KINDS OF FIRE.

In the days of slow loading rifles of limited range, the importance of the *volley* was due to the fact that it enabled the leader to develop the greatest volume of fire in tactically favorable moments, or, in other words, when large targets were visible for a short time. Modern combat is conducted under different conditions. When black powder was used the volley had the advantage of permitting the powder smoke to clear away during the pauses. This advantage has now also disappeared.

In the Russo-Japanese war, the Japanese used "fire at will" almost exclusively. Volleys were used by them only at long ranges; by troops held in rear and, after an assault, to get the men in hand. These views are not changed in the new regulations, but immediately after firing a volley the men are to re-load without command. Rapid fire is retained. The Russians placed their faith principally in volley fire,* but were soon forced to resort to fire at will. The Russian regulations recommended volley fire up to the decisive firing position, not so much because of a belief in the superior efficacy of this kind of fire, but out of distrust of the individual training of their men; certainly an admission of the deficiency of that kind of training in their army. It was feared that fire at will would impair fire discipline and cause waste of ammunition, and it was believed that the immediate influence of superiors could not be dispensed with. Even the new provisional regulations have not discarded volley fire, which may

At Nicholson's Neck (24th Oct., 1899) the British leaders ordered their men, who were firing at will on the Boers advancing from cover to cover ("Boer Attack"*) to discontinue that fire, and to use volleys only. But the enemy consistently avoided presenting large targets to the British volley fire.

be employed by section or by platoon. Fire at will may be divided into slow fire (one shot from each squad) and lively fire with counted cartridges.

Germany. Volleys (pars. 106—108 German I. F. R.) are to be employed by platoons or companies when in close order; in skirmish line (par. 193 German I. F. R.) only when the enemy is surprised or the organization is to be kept firmly in hand. Volleys, however, can be used only when the troops themselves are not exposed to an effective fire. An organization will be able to ascertain the range by means of trial volleys only in exceptional cases.

"The highest attainable rate of fire—the word rapid fire has been elided—is to be used in attack during the preparation for the assault; in defense to repulse a hostile assault; in warding off a cavalry charge; in all combat situations in which a sudden or immediate collision with the enemy occurs; and, finally, in pursuit." (Par. 208 German I. F. R.).

Fire at will is used both in extended and close order.

Volley Fire and Fire at Will. Bursts of Fire (Rafales). *Il n'y a de feu practicable devant l'ennemi que celui à volonté."* NAPOLEON.*

"It may be objected that one frequently reads in military history of effective volleys. The explanation of this is that many of the so-called volleys mentioned in accounts were volleys only in name. In a few instances the defender endeavored to fire volleys, but usually their effect was insignificant." v. BOGUSLAWSKI.

"Fire at will was forbidden. Volley fire was used only by direction of the commanders of the battalion sections of the line. The order to fire volleys quickly ran along the trenches. For a few minutes a certain amount of unrest was noticeable among the men, which, if allowed to continue, might have degenerated into confusion and later perhaps into disorderly flight.

"The first volley was not quite successful. It was ragged—some men even firing a second time without waiting for the command, an example likely to be followed by the others. The force was on the point of getting out of hand. Volleys fired by neighboring sections drowned the voice of the commander. In such situations only personal experience and resourcefulness can tell a company commander what to do. We recom-

*"Fire at will is the only kind of fire practicable when engaged with the enemy." NAPOLEON.

mend a course which has always been attended with success in practice. Let the officer commanding a section jump upon the parapet and from there give the order 'cease firing.' Then, if the enemy's fire permits, and his own heart is stout enough, let him order the next volley from his position on the parapet. When once the force is again under control, the volleys will be as good as if the enemy were not so close." KUROPATKIN-KRAHMER *Kritische Rückblicke auf den Russisch-Türkischen Krieg,* II, pp. 304 and 310.

In his *Comments on Drill Regulations* (16th Nov., 1840) Prince WILLIAM, subsequently Emperor WILLIAM I. of Germany, says:

"I am personally opposed to volleys by battalion. I am of the opinion that in war volleys and file fire will seldom be used. Should this fire be used, however, no one will be able to stop file firing after volley firing, even though not ordered, *because in my opinion it is impossible to combat human nature,* which finds more security in rapid loading and firing than in awaiting the commands . . ."

Russian experiences in Manchuria. "At first *volleys* by formed bodies of troops were attempted, but later fire at will was used. In the latter, the men were forbidden to hurry, were instructed to bring their pieces down to the 'ready,' and, whenever it was possible to see the enemy—who was advancing by rushes—to change their rear sight elevations at the whistle signal of their commander. . . . When at a distance from the enemy the men remained cool and fired faultless volleys. When the enemy came closer the volleys deteriorated. The Russians used only fire at will at ranges under 800 paces. This enabled the men to fire on individual hostile skirmishers and to place the boldest out of action." SOLOVIEV.

Austria. *Volleys* are employed, as a rule, only by bodies in close order, for the purpose of finding the range, and for firing upon targets which appear suddenly at long range and which will probably be visible for only a short time. Fire at will is the principal kind of fire used, the rate of fire being increased or decreased by the men according to the existing situation. When necessary, the leaders should regulate the fire; but this should only be done in exceptional cases as the men are apt to increase rather than diminish the rate of fire ("Rapid fire").

The *maximum rate of fire* is to be employed: "In *attack,* for the purpose of gaining a superiority of fire at short range; in *defense,* for the purpose of warding off an impending assault. It is moreover to be used to inflict the greatest possible losses on a defeated enemy as long as he is within effective range; and, finally, in fire surprises, repulse of cavalry attacks, and in rencontres with the enemy."

France. The French *Lebel* rifle has a cylindrical magazine situated under the stock and has a capacity of eight cartridges which have to be loaded singly. As a rule, *fire with counted cartridges* is employed (*feu à cartouches comptées*) for the purpose of obtaining a "burst of fire" (*rafale*). The *rafale* consists of firmly controlled, concentrated, collective

fire. Fire at will (*feu à volonté*) is also used, eight rounds per minute being fired at the short ranges. The rapidity of this fire at will may be increased up to 12 rounds per minute by employing the cartridges in the magazine (*feu à répétition*). One minute is required to fill the magazine. Volleys are to be employed in night combats and when it becomes necessary to control the men. In exceptional cases individual men are directed to fire.

England and Switzerland. The only fire employed is fire at will. The rapidity of this fire varies according to the nature of the target and the range.

Italy. Fire at will (in close order in two or four ranks).

Japan and Russia. (See p. 157, supra).

The Rate of Fire.

As regards its rate, fire may be divided into three classes, viz., *slow fire, accelerated fire,* and *rapid fire.* The command "fire more slowly" (or more rapidly) serves only the purpose of diminishing (or increasing) the rate of fire.

The rate of fire depends upon the purpose of action, the character of the target, and the available ammunition. Unfavorable illumination and the difficulty of clearly distinguishing the target at long ranges will reduce the rate of fire. The aiming position (*i.e.,* whether the rifle is fired from a prone position or from a rest) also affects the rate of fire. A well trained company at peace strength will, moreover, be able to fire more rapidly than one on a war footing.

Hurried firing should unquestionably be condemned. The rapidity with which our rifles can be loaded enables us to produce the maximum fire effect in the minimum time against narrow targets. *The desire of the soldier to make every shot a hit, carefully inculcated in time of peace, will of itself regulate the rate of fire.* As the rate of fire depends upon the distinctness with which the target can be seen, it will naturally increase as the range decreases, thus generally corresponding to the requirements of the tactical situation. Moreover, as it is easier to aim at tall targets than at head targets, this also exercises either an accelerating or a retarding effect, as the

case may be. Lieutenant-General Rohne has done a great deal to bring about a correct appreciation of the rate of fire. He states: "The opposition to an increased rate of fire is perhaps due to the belief that it is invariably coupled with a reduction in accuracy. This is not the case, however, and even if it were true to a certain extent, it need not necessarily be harmful. To be sure, when a high rate of fire is solely due to the excitement of the skirmishers, it is unquestionably to be condemned because no attempt is made at aiming; but when it is the product of systematic peace training, it need not necessarily preclude good aiming. It is entirely consistent with a high rate of fire to load and point quickly, to keep the target constantly in view, and, at the same time, to aim accurately and to pull the trigger without flinching.

"The leader who reduces the rapidity of fire in battle in order to save ammunition, wastes lives and time, both more valuable than ammunition. Disabled soldiers are more difficult to replace than ammunition, and lost time cannot be replaced at all."*

A high rate of fire need by no means be synonymous with waste of ammunition. Ammunition would unquestionably be wasted if fire were delivered for hours at the same high rate. It is very probable, however, that in the battles of the future the fire will be moderate for some time, or, better still, cease entirely, only to break forth like a thunderstorm over the enemy when opportunity offers or necessity demands. The slower the troops fire the longer they will present a target to the enemy. The coolness shown in firing individual shots at the commencement of an action will disappear owing to the impression produced by losses. This is apparent even in field firing. Lieutenant-General Rohne arrives at the following average results:

*Schiesslehre für die Infanterie, 2nd Edition.

Ranges	up to	400	m.	5	rounds	per	minute;
"	from	400— 700	"	4—5	"	"	"
"	"	700—1000	"	3—4	"	"	"
"	"	1000—1300	"	2—3	"	"	"
"	"	1300—1500	"	1—4	"	"	"
"	over	1500	"	1	"	"	"

Troops going into action for the first time are inclined to fire entirely too fast, due to their desire to overcome their nervousness. Veteran troops seek to attain the same result, not through rapidity of fire, but through accuracy. Only the determination to make hits is calculated to overcome nervousness. Wherever this determination is lacking, wild firing (fire panic), which is in any case difficult to prevent, will surely result. Fire delivered hurriedly during unexpected rencontres is almost invariably ineffective.* For this reason most of the firing regulations have eliminated the command "Rapid Fire," which is only calculated to produce confusion.

The Italian Firing Regulations contain the following statement in regard to the effect of accelerated fire (see p. 140 supra).†

1. *When the appropriate elevation is used,* two-thirds of the percentage of hits obtained by firing 5—6 rounds from each rifle per minute, may be expected when firing at the rate of 12—14 rounds per minute.

2. *When the elevation selected is too great or too small by 100 m.,* rapid fire produces almost the *same percentage* of hits as ordinary fire at will.

3. *When the elevation selected is in error by 200 m.,* rapid fire produces almost *twice as great a percentage* of hits as fire at will.

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*At Beaumont the 9th Company of the 27th Infantry, after a long advance at double time, encountered the flank of a hostile battalion. The men became excited, raised the leaves of their rear sights, and opened rapid fire, which had no effect whatever, as the range was only 200 paces. *Geschichte des Regiments, Nr. 27,* p. 95.

†Consult also *Schiesszversuche der k. u. k. Armeeschiessschule seit dem Jahre,* 1900, Vienna, 1905. ROHNE, *Schiesslehre für die Infanterie,* 2nd Edition, p. 132.

From the above it follows that, when the appropriate elevation is not used, accelerated fire will inflict greater losses upon the enemy than ordinary fire at will in the same length of time. Within equal periods of time the actual number of hits will be greater in animated fire at will than in slow fire; but in the latter the percentage of hits will be higher.

Of all the different kinds of fire, the *volley* is best adapted to meet the requirement of keeping the troops in hand, of concentrating the fire, and thereby producing great moral effect. Volleys are of value to troops in ambush, in repulsing cavalry attacks, and in preventing premature firing against the wishes of the commander. They should be used against staffs which would be able to seek cover or spread out when exposed to fire at will.

As the men are, however, not equally skilled in loading their pieces, the rate of fire is very little increased by the use of volleys. The command "Fire" can only be given when the pieces of the entire unit are directed upon the target. The length of the pause between preliminary command and command of execution varies, depending upon the distinctness with which the target can be seen, the range, and the aiming position. When the fire is delivered from a prone position it will be difficult to determine when the command of execution should properly be given. Moreover, as fire from a standing or kneeling position will be the exception, this has contributed to eliminate volley firing on the battlefield, because the troops lack coolness—mental as well as physical—which is indispensable in every volley.

The material and moral effect of a volley is doubtless very considerable, but who could possibly make his voice heard when a deployed platoon of sixty men is firing? How about the efficacy of the fire when the men revert of their own accord from volleys to fire at will, which they will do when their

officers are either killed or wounded and they themselves are exposed to fire?*

If we use squad volleys (Russia), we approximate fire at will without any of its advantages, besides which, commands, given by so many leaders, tend to confuse the men. Moreover, it is very difficult to handle the platoon, to stop firing, to change target, and to initiate movements. Volley firing is therefore confined to the preparatory stage of combat and to rare moments in which the troops firing are not themselves under effective fire. In the defense of fortified positions many opportunities will be found for the employment of volley fire. The use of trial volleys for the purpose of testing the rear sight elevation will be confined to a few favorable cases, and it may be remarked that animated fire at will concentrated on some definite point produces the same results.

The French, who retained volleys longer than the other powers (to keep the men in hand, to regulate the expenditure of ammunition, and to direct a concentrated collective fire upon the most important target according to the will of the leader), found a substitute in the fire with counted cartridges,† the "burst of fire" (rafale).‡ This was also adopted by their artillery. In Germany, the importance of the sudden effect produced by these "bursts of fire" is recognized, but the same object is sought to be attained by training alone; while

*During the advance on Flavigny (Vionville), the support of the 10th Company, 12th Infantry, was to move into the firing line for the purpose of firing volleys. "The volley was by no means a good one, however, and the men at once took up rapid fire. Lieutenant C—— jumped in front of the men to stop the firing, but was shot in the leg and crawled back. The rapid fire continued along the entire line." *Geschichte des Regiments, Nr. 12,* p. 454.

During the war between Servia and Bulgaria the Servians always opened the infantry combat with volleys, but after casualties had occurred among the officers under the heavy fire of the enemy, the steady volley fire soon degenerated into wild, hurried fire at will, which produced no effect whatever.

†Temporarily adopted in Germany also.

‡Par. 194.1 of the *French Infantry Drill Regulations* of Dec. 3rd, 1904, states: "The moral effect produced upon an opponent by the fire is much more considerable when the fire is concentrated and delivered suddenly and unexpectedly." Par. 194.4 states: "The efficacy of the fire, due to its intensity, is augmented when the enemy is taken by surprise," etc. Par. 195.1 states: "The fire is, as a rule, delivered by 'rafales,' which are short, sudden and violent; and, in exceptional cases, by volleys."

in Russia, fire with counted cartridges has been adopted, not for the purpose of obtaining rafale fire effect, but for keeping the men in hand. Rafale fire has the disadvantage that pauses in the fire are regulated formally, and that these pauses occur frequently at the very moment when a favorable target is still visible. Will the individual soldier remain cool in the excitement of battle and carefully count the three or five cartridges which he is to fire? In defense, rafale fire is proper, because the skirmisher in the defensive line is completely hidden during the pauses, while the attacker presents favorable targets only temporarily, thus justifying an increased expenditure of ammunition. In attack, suitable targets are rarely available for rafale fire, and a substitute for this fire must be sought in well directed, steadily delivered fire at will, interrupted by rushes to the front. During an attack, rafale fire might degenerate into wild, uncontrolled fire at will, the rapidity of which decreases only when the ammunition runs short. The employment of this class of fire might sometimes be advisable in action when it becomes necessary to hold the enemy, that is, in defensive situations. In this connection, one who is thoroughly familiar with the French army aptly says: "Rafale fire may be likened to the wild passes made by a man, backed up against a wall, for the purpose of warding off an adversary who is able to decide the controversy with one well-aimed blow."

9. REAR SIGHT ELEVATIONS AND POINTS OF AIM.

In Switzerland and Italy the employment of a single rear sight elevation, less than the actual range, is preferred, even when the range is not accurately known. The French regulations are silent on this subject. In Germany one rear sight elevation is used, as a general rule, up to 1,000 m.; beyond

that range combined sights may be used in which the two rear sight elevations differ from each other by 100 or 50 m.*

"Rapidly approaching or receding targets are followed by making proper sight corrections, rear sight elevations being less than the range when the fire is delivered against advancing targets and greater than the range when the fire is delivered against receding targets. At short ranges the same result may be obtained by aiming lower or higher. It should be noted that, when firing on cavalry making a mounted attack, the danger space is continuous when the sights are raised to 700 m." (Par. 192 German I. F. R.). As a general rule, the proper aiming point is the lowest line of the target. When it becomes necessary to aim at the center, to one side of or below a target, its dimensions will serve as a guide. A change in the rear sight elevation is necessary at medium and long ranges to raise or lower the sheaf of fire; at short ranges it is practicable to point higher only when the target is tall. When the velocity of a side wind cannot be estimated, it is advisable to distribute the fire over a broader front. At short ranges the selection of an aiming point may, under favorable circumstances, be left to the discretion of the individual skirmishers.

10. COMMANDS.

In recounting the several commands to be given for firing, the regulations take into consideration the logical sequence of the tasks devolving upon the skirmisher. Thus the first command draws the skirmisher's attention to the target; the second indicates the range; the third directs him to open fire.

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*See ROHNE, *Schieszlehre für die Infanterie*, p. 95, et seq.

In view of the greater dispersion of fire in action, the author recommends the selection of either one elevation only, or, at the longer ranges, the employment of combined sights, in which the elevations differ from each other by 200 m. In peace time the use of combined sights, by well-trained marksmen, in which rear sight elevations differ by only 50 m. would, indeed, be sufficient to increase the number of hits, but on the battlefield the favorable conditions found on the target range are lacking.

11. THE OBSERVATION OF THE FIRE.

The actions of the enemy are usually the only reliable indication of the location of the sheaf of fire directed against him; the observed strike of bullets is seldom so good an indication. It is especially difficult to judge of the distribution of projectiles from their strike in front and in rear of the target. Suggestions from the subordinate leaders, whose view of the target is generally restricted, are often more confusing than valuable.

12. THE EFFECT OF FIRE.

COMPARISON BETWEEN LOSSES PRODUCED BY INFANTRY AND ARTILLERY FIRE.

In 1866 the Austrian artillery inflicted 16% of our losses. In 1870-71 the French artillery inflicted 8% of our losses. Up to the battle of Liao Yang the Ist Japanese Army suffered the following losses:

	PERCENTAGES.			WOUNDS.		
	Small arms fire.	Art'y fire.	Cutting weapons.	Serious.	Slight.	Very slight.
Guard Div....	88.42	11.50	0.08	32.17	62.49	5.34
2d Div.....	89.43	7.91	2.30	44.05	54.89	1.06
12th Div.....	80.52	14.48	2.09	39.12	46.36	14.52
Average....	86.12	11.30	2.09	38.45	54.58	6.97

The figures given above under the captions "serious" (including killed), "slight," and "very slight" wounds have, of course, only a relative value. The following figures express the average losses of Russians and Japanese:

Losses through rifle fire. 85.9%
Losses through artillery fire. 11.4%
Losses through cutting weapons. 3.2%

Modern fire tactics count upon a prolonged fire for the purpose of gradually exhausting the enemy, and upon rapid fire, suddenly delivered, for annihilating him.

While a statement of the percentage of hits* throws some light upon the effect of the fire of an organization, under normal conditions, the number of figures placed out of action affords a standard of comparison by means of which tactical success may be measured, and aids in deciding how to distribute the fire. Differences in fire effect on like targets are best determined by comparing the number of figures hit per minute by 100 marksmen, as a great number of hits is presupposed, which is not the case when the percentage of hits is taken.

(a) Influence of Training.

Individual skill in marksmanship is of decisive importance when firing at targets of appropriate size at the short ranges. A good marksman, firing at will, may (not *must*) expect a hit from each round fired, at any target within 250 m., at a single kneeling opponent within 350 m., at a kneeling file within 500 m., and at a standing file within 600 m. At ranges beyond this, influences, due to the imperfections of the rifle, make themselves felt; and these influences grow to such an extent that the best marksmanship training is unable to eliminate them. A considerable number of rifles must fire in order to produce an effect; for, as some of the pieces fire short

*In this connection the following works have been consulted: *Das Gefechtsmässige Abteilungsschiessen der Infanterie*, 4th Edition (1905), by Lieutenant-General ROHNE, and *Schiesslehre für die Infanterie*, 2nd Edition (1906), by the same author; also *Militär-Wochenblatt* No. 46 of 1900. To be sure, absolute trustworthiness cannot be claimed for the figures given, for the conditions of firing in action are variable; but, as obtained by Lieutenant-General Rohne, they serve as an excellent standard of comparison, and, when their relative value is considered, as a basis for tactical deductions.

and others over, the hits are thus distributed over a greater area. But even here skill in marksmanship is apparent in that the cone of dispersion of the excellent shots produces a shot group of small diameter, that of the poorer shots one of very large diameter. Lieutenant-General Rohne computed (*Schiesslehre für die Infanterie,* p. 84) that when firing rifle model '98 with the appropriate elevation at a target 1 m. high, the marksmen named in the following table would obtain the number of hits given at the ranges indicated:

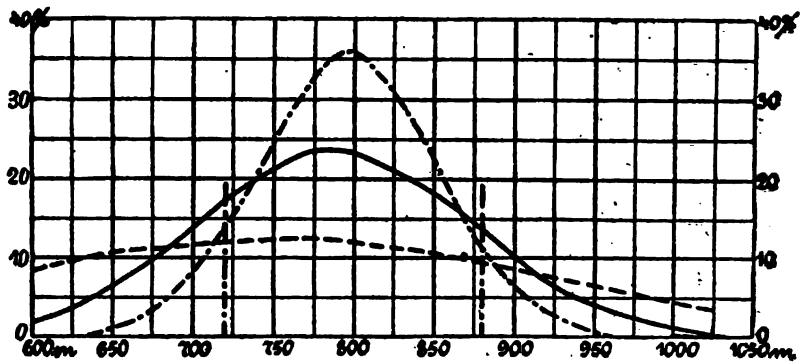
Range.	Number of Hits Obtained by		
	Excellent shots	Fair shots	Poor shots
	Out of 100 rounds fired.		
1000 m.....	27.	17.6	8.9
1500 m.....	14.2	9.7	4.8

This ratio changes, however, very seriously to the disadvantage of the excellent marksmen when the appropriate elevation is not used. The figure given below, in which the curves of hits are traced, shows that even poor shots may obtain better results in this case.

From this may be deduced the great importance of quickly and accurately ascertaining the range. The excellent ballistic qualities of our rifle and our thorough marksmanship training can assert themselves fully only when the range has been accurately determined. At ranges over 800 m. too great an accuracy in collective fire may be actually detrimental. In this case individual accuracy matters little; the important thing is to direct the densest portion of the sheaf of fire, with some degree of accuracy, on a target the range to which is known only in a general way. The importance of training soldiers in precise marksmanship is ethical rather than practical, for a good target shot need not necessarily be a battle marksman. For the latter a cool head is of more value than all the marksmanship skill of the target range.

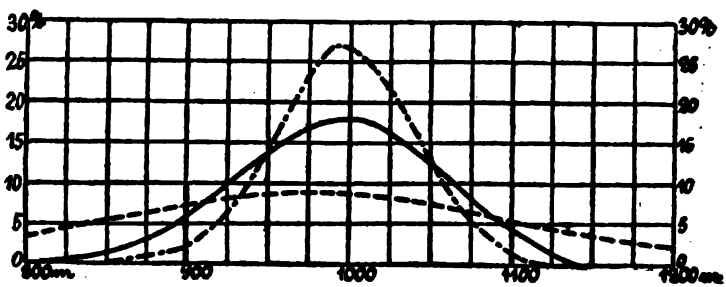
(b) Influence of the Error in Estimating the Range.

At short ranges an error of estimation is offset by the flatness of the trajectory. Lieutenant-General Rohne used a probable error in estimation of 1/8 (12.5%) of the range in his computations. The Swiss Firing Regulations of 1905 count on an error of 100 m. at 500 m., 200 m. at 500 to 1,000 m., 300 m. at ranges over 1,000 m., and the average is taken to be 1/5 of the range, or 20%. For measurements with range finding instruments see p. 146, supra.



Elevation 800 —·—·— Excellent shots
Rifle '98 ——— Fair "
— — — Poor "

Limit of the probable error of estimation.



Elevation 1000.
Rifle '98.

In the following table, the number of hits per 100 rounds fired, at a target 1 m. high, by the marksmen named, is shown under—

"a" When the fire is controlled and the appropriate elevation is used;

"b" When each skirmisher has selected the elevation corresponding to his estimate of the range. In this case it is presumed, however, that the ranges are generally estimated correctly. (ROHNE, *Schieszlehre für die Infanterie*, 2nd Edition, p. 102).

Range.	Excellent shots.		Fair shots.		Poor shots.	
m.	a	b	a	b	a	b
400	65.1	58.5	50.4	47.8	26.6	26.4
600	46.6	32.9	32.9	26.6	16.9	15.8
800	35.2	15.5	23.3	13.9	11.8	9.7
1000	27.	7.5	17.6	7.	8.9	5.9
1200	20.5	4.	13.6	3.9	6.8	3.5
1400	16.1	2.4	10.8	2.4	5.4	2.2
1600	12.5	1.5	8.7	1.5	4.4	1.4

The above table shows that when the elevation selected is in error, the number of hits decreases more rapidly the greater the skill of the marksman; and that an error in estimation is of less importance than marksmanship only at ranges under 800 m.

DIFFERENCE BETWEEN "a" AND "b."

Range. m.	Excellent Shots.	Fair Shots.	Poor Shots.
400	6.6	2.6	0.4
600	13.7	6.3	1.1
800	19.8	9.4	2.1
1000	19.5	10.6	3.0
1200	16.4	9.7	3.3
1400	13.3	8.4	3.2
1600	11.	7.2	2.

(c) Fire Effect as Regards Time. Number of Rounds to be Expended.

The greater the losses inflicted within a short period of time in a limited space, the greater the moral effect of the fire. It should therefore be the aim of the officer charged with fire direction to bring about a decisive effect within the shortest possible time. The leaders must bear in mind from the beginning of the fire fight that the ammunition carried is limited and that the expenditure of a certain amount is equivalent to a loss of power, and this is permissible only where commensurate results would be achieved. When once a decision has been formed to fire on a target, the ammunition necessary to accomplish the object of the fight must be expended without stinting, since ineffective fire impairs the morale of one's own troops and raises that of the enemy.

When the enemy is approximately equal to us in numbers, and is deployed in line at one man per meter of front, presenting breast targets only, the number of rounds per rifle, given in round figures in the following table, will be required to place about one-third of the enemy's force out of action:*

At a range of				300	m.	3	rounds,
"	"	"	"	400	"	5	"
"	"	"	"	500	"	6	"
"	"	"	"	600	"	7.5	"
"	"	"	"	700	"	10	"
"	"	"	"	800	"	13	"
"	"	"	"	900	"	16	"
"	"	"	"	1000	"	25	"
"	"	"	"	1100	"	45	"
"	"	"	"	1200	"	50	"
"	"	"	"	1300	"	57	"
"	"	"	"	1400	"	63	"
"	"	"	"	1500	"	72	"
"	"	"	"	1600	"	80	"

*According to ROHNE, *Schiesslehre für die Infanterie*, 2nd Edition, p. 214.

In the above table it is assumed that an error of estimation of 7.5% was made and that at ranges over 1000 m. two elevations were used. Against head targets, approximately twice the number of rounds indicated above must be expended; and against exposed skirmishers, visible at full height, about half of the number of rounds given. The efficacy is increased when the fire comes from a flank. The following data are taken from an extended firing test: At 600—700 m., 200 skirmishers, firing 5000 rounds against 200 body targets, obtained 4.3% hits and placed 43% of the figures out of action; under the enfilading fire delivered by one platoon, the percentage of hits rose to 10.5%, and the number of incapacitated figures to 80%.

(d) Additional Influences Affecting Accuracy of Fire.

Errors in setting the sight, in pointing, aiming, and pulling the trigger, increase the area of the beaten zone at the expense of fire effect on the actual target selected. When we consider the excitement of men in action, and the numerous sources of error in setting the sights, in pointing and firing, it is clear that we have to reckon with the **effect of misses** on the field of battle more than with the really well aimed and well delivered collective fire of a considerable number of marksmen. Lieutenant Colonel Wolozkoi, late of the Russian Army,* attempted to obtain an approximate standard of measurement for the errors in firing made by marksmen. He bases his deductions upon the opinion that the efficacy of rifle fire in action depends entirely upon the mental and physical condition of the individual soldier at the moment; that in serious engagements this condition is such that accurate aiming cannot be expected; and finally that every skirmisher, according to the degree of his excitement or fatigue, will fire his piece at varying angles of elevation. He argues that this produces a rigid cone of dispersion, whose limits correspond to certain

*Das Gewehrfeuer im Gefecht, 1888.

extreme angles of error, and whose axis (center trajectory) corresponds to a mean angle of error; that, for each class of rifles, the depth of the resulting beaten zone is constant; and that the depth of this zone increases with the range corresponding to the angles of error. It follows that the depth of this beaten zone is greater in modern rifles than in those of older pattern.

He believes that peace training will have fulfilled its mission if the skirmisher, while firing, holds his piece in the position to which he has become habituated through years of practice. This position can be none other than that in which the piece is horizontal.

Although the theory of the **Rigid, Constant Cone of Misses,** is not tenable in this form, because there will always be a reasonably compact core of hits (the dimensions of which depend upon the conditions indicated in the firing regulations) at the center of the cone of fire, the views of Colonel Wolozkoi have, nevertheless, a certain value for us, and find application in large, hotly contested battles, especially when the firing line has been exposed to the material and moral influences of hostile fire for a considerable length of time. At the commencement of every combat we can, at any rate, count on "aimed fire"; but instead of reckoning at all times with a 75% core of hits, 100 m. in diameter, we must become used to reckoning with a 30 and 40% core of hits, of the same diameter, produced by greater dispersion of the bullets.

According to experiments made by Colonel Wolozkoi, a good shot makes a mean angular error of ±8 minutes, when using the horizontal aiming position; a poor shot, one of ±40 minutes; the average error being ±25 minutes. In this, however, the sources of error, due to excitement on the part of the marksmen, are not considered. "The principal angular errors can be traced to the nervousness of the marksmen; and this is directly proportional to the magnitude of the danger

and the suddenness of its appearance. The soldier judges the magnitude of danger by the number of hostile projectiles and by their effect. Therefore, the livelier the hostile fire, and the longer it continues, the greater the danger appears to him; while the less the effect of that fire, and the better he is sheltered from it, the less he will think himself endangered. On this account, the nervous tension of the individual soldier will reach different degrees of intensity according to the magnitude of the danger.

"Now there are combat situations where the danger is insignificant, and entire engagements in which the impression produced by danger may be called moderate; moreover, even in lively actions phases may occur in which this is equally true. The circumstances of each particular case will, therefore, determine how long it is possible to fire as prescribed in the firing regulations, and from what moment a reduction of efficacy, according to Colonel Wolozkoi's theory, is unavoidable.

"The arrival of this moment will be postponed more or less by better discipline and training; and, in addition, at the commencement of an action, we may count on the men putting into practice, to a certain extent, what they have been taught in time of peace. However, the efficacy of rifle fire will deteriorate gradually, as the danger and the intensity of the fight increase, until it reaches the stage which Wolozkoi considers peculiar to all of the more serious actions.

"When discipline is still further reduced, the efforts of the men to keep under cover may lead them to duck even their heads and to fire their rifles at high angles. In this case the decisive short ranges would not be swept by fire, making it possible for the more determined of the two opponents to advance to the assault.

"This reduction of the efficacy of fire (*i.e.*, the delivery of fire at high angles) may also take place when troops are surprised and, in consequence thereof, fire hurriedly. This ex-

plains why the enemy's fire passes entirely over a body of troops which has gotten quite close to his position—by no means an unusual phenomenon in surprises."*

Wolozkoi assumes that the core of hits of his constant cone is formed by projectiles fired at a mean angle of departure of less than 4 degrees, while the lower trajectories of the whole cone of fire correspond to an angle of 1 degree and 30 minutes, and the upper trajectories to one of 14 degrees and 30 minutes. If we apply these figures to a particular rifle we obtain a beaten zone containing 50% of the hits (central zone) at 560—1500 m. for the *Chassepot* rifle; at 1000—2000 m. for the 8 mm. rifle, and at 1200—3000 m. for the 6.5 mm. rifle. It should once more be emphasized that these figures are applicable in combat phases in which the men themselves are under fire, while firing, or deliver their fire hurriedly or with bad aim.

During the **Franco-German war** the German troops learned by experience that the defender's fire inflicted serious losses on the attacker at long ranges, but that the efficacy of his fire did not increase as the skirmishers came closer to his position; that, on the contrary, the intensity of the hostile fire effect fell off noticeably at ranges below 600 m.

During the attack made by the Prussian Guard against **St. Privat,** the greatest number of dead and wounded were counted at ranges from 1200—1500 m., and the fewest losses were sustained at ranges from 500—600 m. from the enemy's position, where it had to remain stationary on the slope for about an hour awaiting the effect of the enveloping movement made by the Saxon Army Corps. A range of 1500 m. corresponds approximately to an angle of departure of 5 degrees for the *Chassepot* rifle. The 20th Infantry Division was molested by rifle fire from **St. Privat,** during its march from **St. Ail** to **St. Privat** (the range in this case was 2200 m., which corresponds to an angle of departure of 15 degrees 30 minutes for the *Chassepot* rifle) although the skirmishers of the Guard, against whom this fire was directed, were only from 400 to 500 m. from the French position.

In the **Russo-Turkish war** of 1877-78, the same thing occurred. Infantry projectiles reached the Russian reserves while they were still 2500 m. from the enemy (this range corresponds to an angle of departure of 14 degrees 30 minutes).

*F. C. v. H. *Zum Studium der Taktik,* p. 97.

Kuropatkin corroborates the statement that at 1500 m. and beyond (5 degrees 50 minutes), the losses produced by the Turkish rifle fire were very serious; that at 400 m. (1 degree 8 minutes) from the hostile position, on the other hand, the losses were remarkably small, sometimes even ceasing entirely. The Turks finally kept their heads under cover altogether.

A correspondent writes the following in regard to the engagement at **Slivnica** on November 17th to 19th, 1885: "When at 400 m. from the enemy, the firing lines suffered scarcely any losses, while the reserves, stationed far to the rear, suffered severely from stray shots."

It must be the endeavor of peace training to prevent the occurrence of unaimed firing in battle. This necessitates careful supervision by squad and platoon leaders over the individual soldier in the firing line, and the severe punishment of every act of carelessness in pointing, aiming, and setting of the sight, in peace time. In war one must constantly endeavor to avoid opening fire prematurely, as it tires the eye and the arm of the soldier, to check any unjustifiable rapidity of fire, and to hold the men down to a steady and slow fire. This includes, in addition, the avoidance, by the leader, of haste in giving directions for firing. In defense, one will have to make every effort to withdraw one's men from the moral effect of the attacker's fire preparation, and to keep them in proper condition to repulse the assault. This requires the construction of splinter proofs, head cover, and, in case the hostile fire becomes too deadly, a cessation of fire, which is again resumed when the enemy attempts to advance. To carry this out properly, covered observation stations should be built, and the men instructed to line the parapet and to open fire at a signal previously agreed upon, sights having been set and ammunition replenished before they leave cover. A body of troops is not unfit to resist an assault simply because it has suffered a certain percentage of losses, but because each individual soldier is so mastered by the feeling that he is in danger of losing his life that he fires his piece without raising his head above the parapet. A body of troops in such a state will fire its projectiles in Wolozkoi's "constant cone."

A mobilized organization, thoroughly trained in time of peace, will still fire a by no means inconsiderable fraction of its projectiles with good aim and with the proper rear sight elevation, provided its officers are equal to their task.

(e) The Influence of Rifle-Rests in Firing.

Freehand firing increases the rate of fire. Whether the skirmisher fires freehand or from a rest is of influence on the accuracy of the single shot at short ranges. The Belgian, Dutch, and Italian regulations authorize the bayonet, in the absence of other expedients, to be stuck into the ground as a riflerest, while this is forbidden in Germany. Collective fire of short duration delivered at mid ranges has not been found superior because of the use of rifle-rests. Fire delivered from a rest is undoubtedly superior, however, when the barrel of the piece is heated by continued firing (position of the left hand supporting the piece when firing standing, prone, or kneeling) and when the arm of the skirmisher gets tired. When firing from a rest, high shots result from vibrations of the barrel;* and there is also danger, when under fire, that the men will not raise their heads over the parapet, but will fire their pieces into the air. This, as corroborated by the more recent campaigns, is why a fire fight at short range is by no means decided in so short a time as the peace performances of modern rifles lead one to suppose, for great losses do not take place until skirmishers, who have heretofore hugged the ground, rise. At Spionskop, the two opposing firing lines remained stationary for hours at 250 m. from each other.† The

*According to the *Swiss Firing Regulations* the change in height in the point of the target struck amounts to 1/1000 of the range.

†The British infantry (consisting of 2694 men, exclusive of subsequent reinforcements), which was engaged at short range on Spionskop from 3 A. M. until 9:30 P. M., lost 40 officers and 721 men in 18½ hours (one officer to every 18.5 men), *i. e.*, 28.2%. See p. 189 infra.

Japanese found in their attacks that at ranges from 150 to 75 paces the hostile fire had no effect.

(f) Influence of the Ground.*

So far we have considered only the effect of infantry fire on level ground. The efficacy of fire is, however, greatly influenced by the inclination of the ground upon which the cone of dispersion falls. Where the ground rises in respect to the line of sight, the depth of the beaten zone is decreased; where it falls in respect to the line of sight, the depth of the beaten zone is increased.†

The importance of this circumstance is frequently so magnified in the French infantry that sight is lost of tactical requirements. For example, they employ formulae to ascertain the point from which a height can be covered with grazing fire, or propose to defend the ascent to a plateau by evacuating the military crest and occupying the reverse slope, keeping the slope facing the enemy under a grazing fire with the tail ends of the trajectories.

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*MONDEIL, *De la résolution des problèmes de tir sur le champ de bataille*, Paris, 1900.

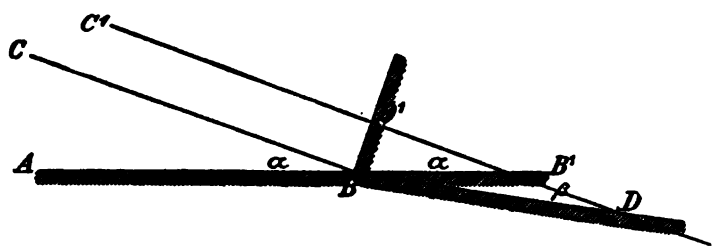
†Lieutenant-General ROHNE's definitions are given below in explanation of certain technical terms:

"Danger Space" is the distance measured along the line of sight within which the trajectory neither rises above the height of the target nor falls below the target.

"Beaten Zone" is the distance measured along the surface of the ground within which the trajectory does not rise above the height of the target.

Whether a target will be struck by a bullet when the range has not been correctly estimated depends entirely upon the danger space. In pointing at the bottom line of the target, the aiming position (*i.e.*, the height at which the piece is held) does not affect the danger space. When pointing at the center of the target the danger space changes, increasing for low rear sight elevations and tall targets, and decreasing for high rear sight elevations and low targets, as compared with aim taken at the bottom line of a target. "The evil effects of errors in estimating the range decrease as the 'danger space' increases, which, by the way, is wholly dependent upon the ballistic properties of the rifle, upon the range, and the height of the target. The danger on the ground in rear of the target fired upon, and the difficulty of bringing up reinforcements and ammunition over it, increases directly as the beaten zone, which in addition depends upon the inclination of the ground to the line of sight."

Let A B B′, in the accompanying figure, represent a horizontal plane pierced by trajectories C B and C′ B′, at an angle α, forming the beaten zone B B′. If now the ground falls from B in the direction B D, it is obvious from the figure, that the angle of fall β decreases and the beaten zone B D increases. The limit of this increase is reached when the angle of slope is greater than the angle of fall of the projectile. In this case there is a dead angle beyond B and toward D. If, on the other hand, the ground be rising, the angle of fall will be C′ D′ B and the beaten zone* decreases to B D′. The smaller the angle of fall of the projectile the greater the influence of the ground.



From this it follows that when fire direction is in competent hands the appearance of the enemy on the terrain as at B D will be fully taken advantage of, while firing on slope like B D′ should be avoided. Troops will, however, rarely be in a position from which they can see a target on the slope B D. The efficacy of the fire will in such a case be more or less

*The computation of beaten zones is based upon the formula deduced by Lieutenant-General ROHNE in his work *Schiesslehre für Infanterie*, p. 127:

Let α = angle of fall;
γ = angle of slope (rising or falling);
b = beaten zone on level ground;

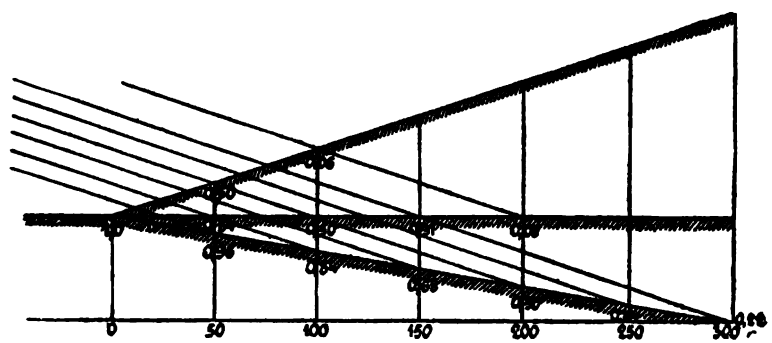
then $\frac{\alpha}{\alpha-\gamma} b$ = beaten zone on falling ground;

$\frac{\alpha}{\alpha+\gamma} b$ = beaten zone on rising ground.

a matter of accident. A body of troops in broad formation will in this case receive a greater number of hits than a column, since each meter of front of the crest line receives a certain number of projectiles. It is otherwise, however, where the slope rises in respect to the line of sight. A line is more easily missed than a column of considerable depth on the march.

The following data in regard to the increase (diminution) of the depth of the beaten zones is taken from the work of Lieutenant-General ROHNE on *Das gefechtsmässige Abteilungsschiessen der Infanterie*, p. 44:

Range.	Rising Slope.		Falling Slope.	
m.	1°	2°	1°	2°
800	$\frac{1}{2}$	$\frac{1}{3}$	∞	∞
1000	$\frac{1}{3}$	$\frac{1}{4}$	2	∞
1200	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{2}$	3
1400	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{3}$	2



The above figure, taken from Lieutenant-General ROHNE's work, *Schiesslehre für die Infanterie*, p. 128, shows the influence of the ground on the efficacy of fire when "poor" shots are firing at a target, 100, 200 m. etc., in rear of which are other targets of the same dimensions but situated either on level ground, on a 2-degree rising slope, or a 1-degree falling slope. On a rising slope of 2 degrees the depth of the beaten zone is decreased by half, and on a downward slope of 1 degree increased by half.

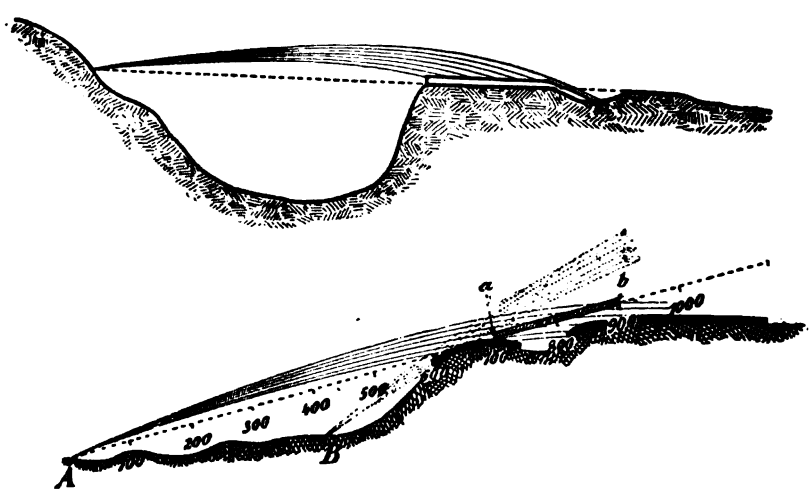
"The knowledge of this influence of the ground is of great impor-

tance to the tactician. For this reason I have selected 'poor' shots for the above example because the efficacy of infantry fire in battle will approximate theirs more nearly than any other. From this we may deduce that where the ground slopes upward in rear of a firing line, less distance will suffice to withdraw supports from the fire directed at the firing line than on level ground; and that, if the ground in rear of the firing line slopes downward, the distances must be increased unless the slope is so great or the hostile trajectories so flat that bullets pass over the crest, forming a 'defiladed space,' into which no projectiles strike."

On ground rising in respect to the line of sight (*i. e.*, on the slope of heights facing the enemy, or opposite to commanding ground, the slope facing the plain) columns suffer the greatest losses; on ground falling in respect to the line of sight (on the reverse slope of hills and on plateaus) line targets suffer the greatest losses.

Where the ground falls at a greater angle than the angle of fall of the projectiles (about 5 degrees at 1500 m., and 1 degree at 800 m.) a defiladed space is formed, which makes it possible to bring supports nearer to the firing line than would be practicable on level ground. If we assume that each graduation of the rear sight over 600 m. commands a space 100 m. deep with the normal core of hits, we obtain the following depths of the beaten zones at a range of 1500 m., with rifle model '98 (angle of fall 5 degrees and 22 minutes):

Ground rising	1 in 10	= 6° =	50 m.
" "	1 in 20	= 3° =	64 m.
" "	1 in 50	= 1° =	81 m.
Ground falling	1 in 10	= 6° =	360 m.
" "	1 in 20	= 3° =	180 m.
" "	1 in 50	= 1° =	113 m.



The figures on pages 181 and 182 show to what extent the ground is capable of increasing or diminishing the efficacy of fire. The French assert that the Würtembergers deliberately applied these principles in the defense of the park wall at **Villiers.** It was, at any rate, only an accident that the masses of troops on the west side of the gently sloping Mamelon de Villiers suffered heavy losses on November 30th, 1870.

General PAQUIÉ of the French Army* lays down the following rule: "When the angle of slope of falling ground corresponds to the angle of fall of the lowest trajectory of a cone of dispersion, the depth of the beaten zone will be 2¼ times greater than on level ground. When the angle of slope of falling ground is equal to the angle of fall of the mean trajectory of a cone of dispersion, the depth of the beaten zone will be 2½ times greater than on level ground. When the lowest trajectory of a cone of dispersion passes over the crest of a hill at the height of a man, and when the reverse slope of that hill is equal to 1/100 of the range, the depth of the beaten zone will be five times as great as on level ground."

These data are of no practical value in war. They serve only to increase the appreciation of fire effect when examining the terrain, and train the eye in judging such situations.

The character of the ground may exert great influence when firing on intrenchments. Fire delivered from low ground against an enemy in shelter-trenches is absolutely ineffective—as shown in the action against the French IInd Corps at **Point du Jour** and by the experiences of the Russians at **Plevna** and **Gorni Dubniac.** This condition becomes aggravated the smaller the angles of fall of the projectiles, and the higher the target is situated relative to the firing position of the attacking party.

Attacks on hill positions show that there is a range at which the greatest efficacy may be obtained from fire directed against the top of the height itself. This maximum efficacy gradually dwindles as the position is approached. This fact has led the Swiss to retain a *Main Firing Position.* (See Figure, p. 182. Fire effect from A and from B). For the purpose of determining the favorable range, "D," corresponding to a certain height (of the enemy's position) "H," Lieutenant-General ROHNE has deduced the following formula for rifle model '88:†

$$D = 15.H + 500.$$

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*See also *Le tir de guerre et les expériences pratiques du camp de Châlons. Journal des sciences militaires,* Sept., Oct., Nov., 1898—*Le Joindre Général. Petit Guide pour les tirs collectifs,* 1904.

†Capitaine CUGNAC, D=14 (H+50). See also the work of Captain KNOBLOCH, *Zur Technik des Feuerangriffs gegen Höhenstellungen, Swiss Monthly Journal,* 1907.

The well-known plateau of the "Galgenhügel" at Wörth, which is at present crowned by the monument of the 50th Infantry (elevation 35 m.) could be effectively swept by the fire of our present-day weapons at 1025 m.; a further advance would reduce the fire effect. For rifle model '98 the formula might be stated: 20. H + 600.

It is only in fortress warfare that it might occasionally be possible to apply this formula. To determine at what distance the defender must take position in rear of a crest, in order to sweep the slope facing the enemy with his fire (aiming points being resorted to) without being himself exposed to view, is of still less value for use in the field. According to General Warnet of the French Army, if "p" is the degree of slope expressed in centimeters, the defender should choose between two points which lie between $(p+5)$ 1000 and $(p+3)$ 1000. When the degree of slope is 1 cm. in 10 cm., the defender should take up his position either 600 or 300 m. in rear of the main crest. In such a position the defender will, it is true, be protected to a certain extent from the enemy's fire, but can only very inadequately defend the slope facing the enemy. A concentration of fire on certain targets is impossible and the attacker is given an opportunity to reach the crest, here and there, without coming under fire. Thus ballistic advantages must be given up in the face of the numerous tactical disadvantages. We have mentioned this subject here, to show the strange excrescenses which an undeniably sound basic principle may develop in the hands of theorists, who have entirely forgotten that in war only that which is simple succeeds.

"Indirect Rifle Fire" is to be used in firing on a target not visible from the firing position. In this connection, the following is taken from the report of Captain KNOBLOCH, Austrian Army,* on *Schieszaufgaben unter feldmäszigen Verhältnissen*:

"Indirect rifle fire is infantry fire in which aiming points are used. These should lie above and beyond the target and in line with it. It goes without saying that an aiming point fulfilling all these conditions will rarely be found. Moreover, the aiming point must not be selected at random at some particular elevation, because the angle between target and aiming point, expressed by graduations on the rear sight leaf, might possibly lead to a negative sight setting.

"In the practical tests made on varied ground against targets of appropriate height, splendid results were obtained as regards effect; but the aiming point had to be indicated by means of a flag. Despite the fact that the terrain was covered with numerous objects, such as trees, woods, factory chimneys, etc., no suitable aiming point could be found on the terrain itself. This largely determines the value of indirect rifle fire in the field."

This class of fire is, however, worth a trial at any rate. Moreover, its tactical, combined with its moral, advantages are so great that we could afford to accept calmly a fire effect poorer by comparison. Indirect rifle fire will, at times, give troops an opportunity to do damage to the enemy without being themselves seen or fired upon.

**Verstecktes Gewehrfeuer. Vorschläge zur Erhöhung des Gefechtswertes unserer Infanterie,* Vienna, 1904. *Feldmäszliges Schieszen der Infanterie aus versteckten Stellungen. Organ der militär-wissenschaftlichen Vereine,* Nos. 1 and 2 of 1906. *Resultate der Schieszversuche mit verstecktem Gewehrfeuer. Mitteilungen über Gegenst. des Artillerie-und Geniewesens,* No. 12 of 1905. *Militär-Wochenblatt,* 1907, No. 28, pp. 144 and 155.

It remains to mention briefly the effect of **ricochets** which, as a rule, tumble* after striking. Their range upon rebounding is short. Bullets ricochet most frequently on water, on rocky and hard ground, more rarely on wet meadows, and on tilled soil, but they do not ricochet at all on sandy soil. Ploughed fields, in which the furrows run obliquely to the line of fire, eliminate the effect of ricochets almost entirely. When jacketed bullets (but not the massive French "D" projectiles) strike upon rocky ground, they have a tendency to alter their form materially, or to tear the jacket, thereby considerably increasing the severity of the wound which is produced. The range of ricochets upon rebounding depends mainly upon the angle at which they are deflected. When the lateral deflection is 30 degrees their range may amount to about 1300 m. The nearer a bullet strikes to the skirmisher firing it, and the smaller the angle of deflection of the consequent ricochet, the greater its range; under favorable conditions this may amount to 2500 m. According to French experiments, in firing at a range of 800 m., 4% ricochet hits struck a target, the height of a man, at 1400 m., and 1% ricochet hits a similar target at 1850 m. from the skirmisher who did the firing.

13. LOSSES IN ACTION.†

An attempt to move troops in close order formations within the zone of uninterrupted infantry fire at ranges under 1500 m. when the enemy is still in condition to direct his fire on them, is bound to lead to losses which make the further tactical employment of these troops impossible.

Bodies of troops following the firing lines will also have to deploy when the hostile fire reaches them, unless they can find cover. It is a disadvantage for them to deploy, and every opportunity to return to close order formation must be utilized.

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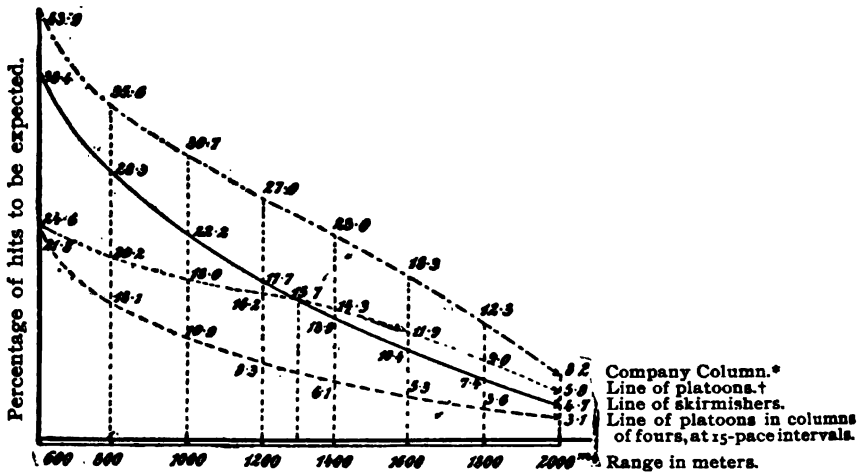
*According to tests, our small-caliber bullets tend to tumble even when only grazing small twigs.

†See *Taktik*, V, p. 76 *et seq.*

Troops in rear, not directly fired upon and exposed only to accidental shots, should employ narrow rather than broad formations. It might therefore seem advisable to remain in route column so long as no flanking fire is received. The Italian Firing Regulations contain the following figure showing the effect of fire directed on troops in the formations indicated.


Percentage of hits to be expected.
Company Column.*
Line of platoons.†
Line of skirmishers.
Line of platoons in columns of fours, at 15-pace intervals.
Range in meters.

According to the figure, the Italian Company Column (German Column of Platoons) suffers the greatest losses; the least losses are sustained by the company formed in line of platoons, each in route column, at intervals of 15 paces. According to French experiments, this formation is said to be no longer suitable when subjected to infantry fire at ranges under 1300 m.

According to French firing tests made in Châlons,‡ the following percentages of hits may be expected when using the Lebel rifle firing old model steel jacketed bullets:

*In Germany called "Column of Platoons."

†In columns of fours, at 6-pace intervals.

‡*Le Joindre, Petit Guide pour les tirs collectifs*, p. 15.

	At a range of			
	1200 m.	1400 m.	1600 m.	1800 m.
Platoon (one rank)	4.4	3.4	2.2	1.4
Skirmish line, men at 3-pace intervals	1.2			
Platoon in column of fours	6.6	3.8	2.2	1.3
Platoon in column of twos	5.6	3.2	1.9	1.1
Company column (German column of platoons)	22.0	18.0	14.0	10.0

Lieutenant-General ROHNE, in his work, *Schieszlehre für die Infanterie,* p. 117, computes values for the relative vulnerability of the several formations. At a range of 1200 m., purely frontal fire only being considered, we obtain with every 1000 rounds fired with the appropriate elevation, the following number of hits against—

	Line.	Column of platoons.	Infantry in route column.
Standing	116	160	98
Prone	20	65	72

And against a company deployed in line of platoons:

	3 platoons, each in route column.	3 platoons, each in column of twos.	6 sections, each in column of twos.
Standing	57	39	29
Prone	28	25	14

The company deployed in line of sections in columns of twos would thus seem to be the most favorable formation for movements, and the line lying prone is especially well suited for halts. For movements under purely frontal, concentrated fire, the line is the least favorable formation, while the route column offers the narrowest target. In this, the character of the terrain plays a decisive role. In firing on targets consisting of columns, it has been assumed that a single projectile will place only one man out of action. Under shrapnel fire the formations are similarly arranged as regards their vulnerability, the line formation being less favorable than the column of platoons, since the former receives all bullets deflected laterally.

The total losses in battles and more serious engagements amount to from 10 to 20% of the participating troops. In some organizations the losses in killed and wounded may amount to as much as 50—60%. The loss that an organization will endure is directly proportional to its efficiency. Good troops, which unexpectedly get into a difficult situation (as, for example, the British Brigade of Highlanders at Magersfontain), and which have been trained to look upon heavy losses as unavoidable, will be capable of enduring a loss of 25% in the course of a battle without going to pieces and without discontinuing the attack.*

At the battle of **Gravelotte,** in which 166,400 rifles, 21,200 sabres, and 732 guns, extending over a front of 19 km., participated on the German side, only 109,200 rifles and 628 guns fought the decisive action. The losses amounted to 9.51%, distributed as follows: 899 officers and 19,260 men; according to arms: infantry, 10.96%; cavalry, 0.66%, and artillery, 5.74%. On the decisive flank, the infantry of the Guard suffered a loss of almost 30%. On this flank, the Rifles of the Guard (*Gardeschützen*) lost 44%, the Ist Battalion of the 2nd Regiment of the Guard, 55.5% of their enlisted strength, the 6th Company of the latter regiment losing even 141 men.

Although losses are, generally speaking, smaller than during the 18th Century, and at the opening of the 19th Century, nevertheless they may amount to a considerable figure in a brief space of time in single bodies of troops which suddenly encounter a heavy fire.

*It is notorious that colonial wars with their moderate losses spoil troops and their leaders in this respect.

At **Magersfontain,** (December 11th, 1899) the British lost 13% of their total strength; the Brigade of Highlanders, 23% (39% of the officers; *i.e.,* 1 officer for every 14.9 men); the IInd Battalion of the Black Watch, 42%, and the IInd Battalion of the Seaforth Highlanders, 23.9%. At **Colenso** (Dec. 15th, 1899) the British lost 6.4% of their total strength; the IInd Battalion of the Royal Dublin Fusiliers, 23.9%.

Spionskop (Jan. 24th, 1900):

Attacking troops.....	2,694 men	in 18½ hrs.	40 officers,	721 men	= 28.2%
Supports	1,600 "	" 10½ "	8 "	95 "	= 6.4%
Reserves	1,500 "	" 4½ "	15 "	170 "	= 12.3%
Staffs	—	—	5 "	—	
	5,794 men		68 officers.	986 men	= 17.5%

This action illustrates strikingly how rapidly the officers directing the fire were shot down.

Attacking troops	1 officer	for	every	18 men
Supports	1 "	"	"	12 "
Reserves	1 "	"	"	11 "
	1 officer	for	every	14 men

For the purpose of comparison, we should like to mention that the Prussian Grenadier Battalion *"von Wedel,"* consisting of 12 officers and 390 men, lost 10 officers and 301 men (77%) in about one hour during the battle of **Soor** (Sept. 30th, 1745). The losses suffered by the Grenadier Battalion *"von Münchow"* at **Kesselsdorf** are possibly not much lower. The effective strength of the last named battalion is not given; it lost 5 officers and 371 men.*

At **Kolin,** the Grenadier Battalion *"Nymschöfsky"* lost 652 men, and six infantry regiments lost between 900 and 1188 men, *i.e.,* considerably more than 50% of their strength. Two days after the battle, the Grenadier Battalion *"Nymschöfsky"* numbered only 24 men and the enlisted strength of six infantry regiments was 233, 296, 602, 651 and 711 men respectively. The number of stragglers was undoubtedly very great.† At **Kolin,** the infantry lost in all 12,307 men out of 19,000, *i. e.,* 65%.

The losses among officers are especially heavy. This is by no means due to the attempt of the hostile skirmishers to pick off the leaders in the combat at short range, but to the fact that, in order to lead their men, officers must expose themselves. This becomes more and more necessary the greater the moral effect of the combat on the nervous systems of the men,

Kriege Friedrichs des Grossen, II, Appendix 8, pp. 11 and 47.

†Ibid., III. Appendix, pp. 11 and 20.

and the poorer the troops. According to past experience, the casualties among officers are especially heavy in the early stages of a war.*

The relative losses of officers and men in the battles named are given, in round figures, in the following table:

At **Weissenburg** (Vth Army Corps).....	1	officer	for	every	14	men;
" **Wörth** (Vth Army Corps).....	1	"	"	"	20	" ;
" **Wörth** (XIth Army Corps).....	1	"	"	"	15	" ;
" **Vionville** (IIIrd Army Corps).....	1	"	"	"	21	" ;
" **Vionville** (Xth Army Corps).....	1	"	"	"	24	" ;
" **Gravelotte** (Guard Corps).....	1	"	"	"	22.5	" ;
" **Gravelotte** (XIIth Army Corps).....	1	"	"	"	20	" ;
" **Colenso**.....	1	"	"	"	15	" ;
" **Magersfontain**.....	1	"	"	"	11.8	" ;

Colonel HESSERT† writes the following in regard to the losses among the officers of the 25th Division on August 18th, 1870: "Eight of the 16 field officers and 6 of the 14 adjutants present with the regiments and battalions were either wounded or killed. Almost all of these officers were mounted. Seventeen of the 40 company commanders—almost all of them dismounted—and 43 of the 151 company officers were placed out of action. This would be a loss of 50% in field officers, 42% in adjutants, 37% in company commanders, and 29% in company officers."

On this day the Rifle Battalion of the Guard lost 100% of its officers and 44% of its men—19 officers and 431 men, in about three-quarters of an hour.

On Sept. 11th, 1877, at **Plevna,** the *Ugla* Regiment lost 20 of its officers, *i.e.,* 40%; the *Jaroslaw* Regiment, 25 officers, *i.e.,* 64%; the total loss of the first named regiment amounted to 42%, that of the last named to 49%. Of the 15 company commanders of the *Vladimir* Regiment, 14 were placed out of action.

After the assault on the **Tuminling Pass** on Oct. 12th, 1905, the East Siberian Rifle Regiment had only 2 officers with its firing line, and after the battle of **Sandepu** only 5. These examples are not isolated ones. After the battle on the **Yalu,** the 11th Rifle Regiment had present for duty only one field officer, and the 12th only 3 captains. On March 7th, 1905, the *Yoshihoka* Regiment (3rd Japanese Division) had present for duty only 3 lieutenants; one battalion was commanded by a first sergeant and one company by a private.

*See *Taktik,* V, pp. 81, 88 and 358.

†*Betrachtungen über die Leistungen der [illegible] Gewehre M/71 und M/66,* Darmstadt, 1879, p. 115.

14. THE MORAL EFFECT OF FIRE.

The moral effect may make itself felt in a two-fold way: as the sum of the impressions influencing the soldier at all times in action, and as the momentary general impression produced by a sudden considerable increase in the losses. The great material effect of fire creates such a consciousness of danger in men's minds that in a defeated force more than half of its numbers succumb to this moral effect of the fire.

"Troops do not retreat because they are unable to maintain themselves owing to their numerical inferiority, but because they fear the losses which they would suffer if they advanced further. The determination to conquer has been overcome by the desire to live. The confusion of impressions increases with the size of the force. Taken individually, the men might behave quite sensibly, but in a crowd they are claimed either by insanity or lethargy. The activity of the mind is completely replaced by imagination; everything is believed; nothing is appraised; exaggeration prevails everywhere; and precipitation produces unthought of results. When the men come to their senses, it is as if they were awakened from a stupor; they are unable to understand how fear could have induced them to do the very opposite from that which would, most surely, have saved them from destruction."*

In the midst of the impressions of the battle of St. Privat, General von Kessel wrote: "The men appear to be either extraordinarily excited or stupefied. Their faces are distorted and only a few still retain firm will power."

General Bonnal describes his first impressions at the battle of Wörth as follows: "Since half-past seven our battalion was lying, facing eastward, in the neighborhood of the wood of Fröschweiler. The shrieking of the Prussian shells, but especially the noise of the shells bursting in the

*KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg*, I, p. 150.

midst of the batteries of the 3rd Division in position in our rear, made a considerable impression on our men. Their joking ceased, and nervousness was plainly visible in their pale faces. Men to whom tobacco was offered declined it; they had no desire to smoke. All eyes were focused upon the officers. The latter were congregated here and there in small groups; a few were trying hard to joke, others were walking up and down, with a cigarette between their lips, making convulsive efforts to appear at ease; a small number were entirely calm as if no danger was present. . . . The first batch of wounded made a strong impression. The battalion was to reinforce the Turcos in the edge of the wood of Fröschweiler. The fire of the Turcos drowned all other sounds. There was nothing to indicate that the enemy was also concentrating a heavy fire upon the wood. We deployed into line to the right. The deployment began, but scarcely ten men had reached the edge of the wood when a terrible cracking and rattling commenced. It was a mitrailleuse battery which fired a volley directly under our very noses. At this moment our men lost their heads. They blazed away like mad, crowded in three, four, and five ranks at the foot of the downward slope. The men in front had thrown themselves to the ground, the others fired kneeling or standing, leaning against trees. Since all of the men fired without aiming, enveloped moreover by a dense, impenetrable cloud of smoke, the advanced lines were in greater danger of being hit by French bullets than by those of the enemy. We had to throw ourselves to the ground to avoid being shot down by the lines in rear. On the hill opposite to us, at a range of 300 to 400 m., there rested a white smoke cloud, and we could indistinctly discern the enemy, who was keeping up a lively fire. The powder smoke enveloping us was so dense that we literally could not breathe." This excitement gradually subsided and the leaders were able to get the troops again under control.

The numerous surrenders of British troops in the engagements of the Boer War were due to the peculiar conditions

existing in the theater of war. Besides, Boer and Briton spoke the same language. During the first few days of the campaign, surrenders of detachments of considerable strength took place. These were not punished with sufficient severity. One almost gains the impression that the men considered the surrenders justifiable in order to escape from a difficult situation.

On the South African battlefields, devoid of cover and swept for great distances by the hostile fire, it was indeed very difficult to penetrate the hostile position, and retrogade movements were undoubtedly attended with heavy losses. To this may be added the fact that it was easy for the Boers, who were mounted, to bar the way to isolated British forces. It must be remembered, moreover, that the operations took place during the hottest season and in a country where water is scarce; and that the men felt they had arrived at the limit of their powers of physical endurance at an earlier moment than would have been the case under different conditions. Thus, the surrender at Stromberg of troops exhausted from a night march, is perhaps excusable; not so, however, the surrender of Colonel Carleton's detachment, which laid down its arms at Nicholson's Neck after offering a feeble resistance. In the last-mentioned case, it is true, several Englishmen, who had already laid down their arms, stood among the Boers so that the commander of the British force did not really know just what action to take in this situation. His hesitation decided his fate. The demand must unquestionably be made in future also,* that troops surrounded in the field make a serious attempt to cut their way out before permitting thoughts of surrender to enter their minds.

It is impossible to determine theoretically what losses troops are able to endure. After the Franco-German War it

*In contrast to this view the British court of inquiry found all but three of the 226 surrenders, which occurred up to June 1st, 1900, justified. In the three cases in which the verdict was adverse only a few men had surrendered. Within a period of eight months the British lost a total of 1680 officers and 2124 men killed and wounded, while their loss in prisoners amounted to 182 officers and 4984 men.

was believed that troops had reached the limit of endurance after losing one-third to one-fourth of their strength. Nowadays this limit would appear to be reached much sooner. It may be pointed out, however, that the neglect of continuing the attack at Colenso (loss 5.8%), and at Spionskop (loss 7.2%), may, in part, be charged to lack of energy in the commander; and that the Brigade of Highlanders, consisting of 2000 rifles and deployed on a front of about 4000 m., in the engagement at Paardeberg (loss 13.4%), lacked the necessary depth to continue the attack. The greater the degree of efficiency and freshness of troops, and the less the degree of suddenness with which they enter a difficult situation, the greater the losses which they will be capable of enduring. Furthermore, we should not forget that our modern personnel has become much more susceptible to the impressions of battle. The steadily improving standards of living tend to increase the instinct of self-preservation and to diminish the spirit of self-sacrifice. The spirit of the times looks upon war as an avoidable evil, and this militates directly against that courage which has a contempt for death. The fast manner of living at the present day undermines the nervous system,* the fanaticism and the religious and national enthusiasm of a bygone age are lacking, and, finally, the physical powers of the human species are also partly diminishing. The influence exerted by officers on the firing line is nowadays, however, considerably smaller than in the past, so much so that they can actually control only the nearest skirmishers. In addition, the nerve-racking impressions on the battlefield are much greater at present than in the past. The *"void of the battlefield"*† has become especially pro-

*See SPAITS, *Mit Kasaken durch die Mandschurei.* After the author had turned away in disgust from a Chinese execution, he wrote: "And we Europeans will feel just like this in war. We will get to a certain point where the strength of our will and our physical powers will succumb to the weakness of our nerves, and this state we will reach more quickly than did the Russians, who were better off in regard to nerves than members of those armies in which nervousness is carefully fostered." See also this author's remarks about *Courage,* ibid., p. 206.

†This complaint of the "void of the battlefield" is not new. A Saxon officer complains of it in his *Vertrauten Briefen* (Cologne, 1807), and the French officers report on the "void of the battlefield" in the fights around Metz. BONNAL, *L'art nouveau en Tactique,* p. 90.

nounced since the introduction of smokeless powder. *"The invisibility of the enemy directly affects the morale of the soldier, the sources of his energy and his courage. The soldier who cannot see his enemy, is inclined to see him everywhere. It is but a step from this impression to hesitancy and then to fear.* The inertia of the troops for whole days at Magersfontain, Colenso, and Paardeberg, frequently more than 800 m. from the enemy, was not produced by their losses, but by the moral depression which is caused within the effective zone of rifle fire." (General NEGRIER.)*

The effect of danger on the battlefield is indicated by—

1. Derangement of tactical units;

2. The mixing of men of the different units during the action; and

3. The dissolution of units into disorderly masses.

According to the *History of the Kaiser Franz Regiment* (p. 113) immediately after the battle of **St. Privat,** most of the companies numbered only 30 men, and the whole regiment only 340 men, although, allowing for losses, there should have been 1922 men. The three companies of the 39th Füsilier Regiment which had fought in the **Stiring Wald** at **Spicheren,** numbered only 6 officers and 150 men at the close of the fight in the evening,† which means that, allowing for losses, 350 men were missing. After the battle of **Colombey,** when the Füsilier Battalion of the 55th Regiment was assembled, three companies numbered only 120, 60 and 40 men, respectively. This battalion had lost about 300 men.‡

The plan of the battle of Colombey given in the General Staff Account (*Gt. St. W.*) shows at 7 P. M. 17 companies belonging to 5 different infantry regiments, and to two different infantry brigades, occupying a front of 1200 paces, in the following order:

7.	1.	4.	8.	4.	6.	12.	7.	10. 11. 12.	1.	1.	
Jägers.	55.	15.	15.	53.	15.	15.	15.	13.	13.	73.	
				9.10.	4.3.		Cos.				
				15.	73.		Inf.				

Revue des deux mondes, for June, 1902.

†*Gen. St. W.,* I, p. 366.

‡*Geschichte des Regiments,* p. 347.

At **Wörth** 17 different regiments were represented on a front of 5700 paces.

"The assault on **Elsasshausen (Wörth)**, after preliminary forest fighting, mixed up the troops of the different brigades and in some cases caused the dissolution of battalions. . . . The 44th Brigade was the only one that remained in fairly good order. Abreast and in rear of it were portions of all the other regiments (of the XIth Army Corps) which, at the moment, however, represented no actual reserves. Even the battalions in the first line hardly appeared to be tactical entities."*

At several points it was possible to assemble the stragglers into formed bodies; but the men in these, commanded by strange officers, easily succumbed to the influences of the combat, and the units disintegrated rather quickly as soon as they came under fire.†

In the **Giefort Wald (Spicheren)** out of 32 companies (4 brigades) only four companies fought together as a battalion. In the little **Wenzelberg Wood** (at **Nachod**) there were engaged 7½ Austrian battalions (belonging to four different regiments) and 2 Jäger-Battalions, all of these troops belonging to three different brigades.‡ No attempt was made to lead these troops as one body.

In the oak wood at **Dubno (Skalitz)**, there were engaged 12½ and 8½ battalions belonging to four different regiments and to two different army corps. "The Prussian orders led to a breaking up of the order of battle and to a considerable mixing of brigades, regiments and battalions. In consequence of this, control was lost to a certain extent by the commander-in-chief, and the result achieved was mainly due to the skill and intelligence of the subordinate leaders—especially that of the commanders of battalions and half battalions."¶

"The wooded region in rear of **St. Hubert** was thickly infested with stragglers of all arms. White, red, and blue shoulder straps were to be seen in profusion; men with and without rifles; some with helmets, some with caps, some bareheaded. There were no officers present except those stretched wounded upon the ground. The superior officers riding through the valley assembled the men they found, but it proved only a small force that they gathered, for the greater portion of the men were safely ensconced to one side of the bottom of the valley."§ "At 5 P. M., the garrison of **St. Hubert** had increased to 43 companies, belonging to seven different regiments, and the result was utterly hopeless confusion."‖

*Gen. St. W., I, p. 268.

†For details see KUNZ, *Kriegsgeschichtliche Beispiele*, XVI, pp. 122, 124, 177, 231—234.

‡*Austrian Gen. St. W.*, 1866, III, p. 81.

¶ KÜHNE, *Kritische Wanderungen*, II, p. 48.

§HÖNIG, *Vierundzwanzig Stunden Moltkescher Strategie*, p. 139.

‖*Ibid.*, p. 167.

"At 10 P. M., 48 battalions of the VIIth, VIIIth and IInd Corps occupied a space of barely 1500 m. front and a depth of 1000 m., east of the Mance ravine opposite the French position. Fortunately the enemy was so exhausted that we were able to commit the most serious mistakes with impunity under the very muzzles of his rifles."*

"At **Sedan** bodies of infantry of the XIth Corps, as well as of the 46th Infantry and of the 5th Jäger-Battalion, had gotten mixed up with the 43rd Brigade during the course of the battle. The regiments of the 43rd Brigade had likewise been so disorganized that after the capture of **Cazal** the brigade commander had nothing at his disposal but the most heterogeneous mass of troops consisting of about a battalion."†

"In penetrating into **Lovtcha** (1877) the foremost battalions became disorganized. The companies, and even single soldiers, stood around in irregular groups on the streets, crowded into the houses and sought cover in drainage ditches."‡ "In one battalion of the *Kasan* Regiment, which was to move through the town from the left flank, officers and men threw themselves down when the enemy's fire became effective and only with difficulty could they be induced to rise. When the regimental commander fell, everybody fled, carrying along those in rear. Only two company columns, composed of stragglers of different organizations, resisted, deployed into a dense skirmish line and, encouraged by their officers, rushed forward cheering."¶

This fighting power of improvised units, when there were officers left to lead them, was displayed on several occasions at **Plevna.**

The IInd and IIIrd Battalions of the *Kaluga* Regiment (in the third battle of **Plevna**) after taking the second crest, thoughtlessly continued the advance in complete disorder.

"Skobeleff foresaw the coming reverse and attempted to form a reserve, but only by dint of the greatest exertions on the part of the officers was it possible to collect about 100 men belonging to various companies. The men of the IInd and IIIrd Battalions of the Kaluga Regiment were scattered all over the battlefield, the companies had become completely mixed up, and it was a matter of the greatest difficulty to re-form them."§

"Dense firing lines, composed of men of all the regiments, attempted to climb the opposite slope but they got only half way; 400 paces from the Turkish works they halted. The survivers of the organizations participating in the action gradually assembled in Work No. 1, which had been taken. While only a couple of hundred men had taken the work, thousands were now assembled there. Not a single company or battalion

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**Ibid.*, p. 224.

†*Gen. St. W.*, II, p. 1249.

‡KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg*, I, pp. 68 and 72.

¶*Ibid.*, I, p. 72.

§*Ibid.*, I, p. 154.

was intact, every vestige of organization had disappeared; the commanders, and officers generally, had become separated from their units."*

"Prince IMERETINSKI succeeded in forming stragglers into the following improvised units:

3	provisional	companies	of	the	*Libau*	Regiment.
2	"	"	"	"	*Susdal*	"
2½	"	"	"	"	*Vladimir*	"
1	detachment of 100 men of the *Reval* Regiment.					

"These re-formed stragglers were despatched to Skobeleff's assistance and made a successful assault on Work No. 2 from Work No. 1."†

"These stragglers subsequently formed the nucleus of the garrison of Work No. 2. During the night of the 11/12 September, the Russians succeeded in gathering 1000 more men, which were assembled in companies irrespective of the regiments to which they originally belonged. This gathering of stragglers lasted, by the way, up to the afternoon of the 12th of September. The continuance of the fight was made possible only by constantly re-forming the remnants into new organizations and then sending these forward into the fight."‡

The remedies provided by the regulations against these evils are, above all else: Restriction of the front of the several units, the deployment of tactical units side by side in action (instead of in rear of each other) and the use of every opportunity for re-establishing the original organizations. Other suggestions for stemming the tide of disorder as made by the author of *Summer Nights Dream* (1888) (platoons formed in single rank, volley firing, and constant closing toward the center) are impracticable in a serious action. The disintregating effect of a battle is stronger than tactical cohesion. It is better to recognize this fact than to face the enemy with illusory ideas.

It is necessary to train the men in peace time to follow willingly any officer, whether he belong to their own or to another organization; and, for that reason, exercises in provisional organizations are requisite for tactical training—a large number of officers being told to fall out at these exercises to assimilate losses which would occur in action. The

*Ibid., I, pp. 236 and 238.

†Ibid., I, p. 243.

‡Ibid., I, p. 258.

control of mixed firing lines by word of command of an officer is the foundation of order and troop leading, and thus a prerequisite of success in the battles of the future. In a successful engagement, the evils above mentioned are less evident than during a reverse when troops unexpectedly suffer heavy losses or receive fire from the flank or rear. Troops formed into well-organized units can well stand such a test, but in an improvised organization, composed of fractions and men of different units, especially when their own officers are absent, such a crisis may lead to panic.

The following battle episode is very instructive: The Ist Battalion, 4th Infantry, deployed in line of company columns, advanced at **Colombey** (14th August, 1870) under French shell and *Chassepot* fire. The morale of the 3rd Company was visibly impaired by two shells which burst, one after the other, in its ranks, placing 15—20 men out of action. "The men began to hesitate; their steps grew shorter; and, as if impelled by an invisible power, the company executed a half right turn, another half right turn, then another and another. One would have thought the movement was being executed at command. The column was now facing to the rear, and although not running, not fleeing, it was moving back to the Brasserie with suspiciously lengthening steps. The drummer, one Borchert, did everything to bring the men to their senses; the non-commissioned officers assisted bravely, but in vain; the column continued its movement to the rear. Filled with shame and indignation, the perspiration pouring out of every pore, I shouted to the men, repeatedly commanding: 'Company . . . Forward!' But all in vain. At that moment the battalion commander—he was called the 'marble statue' on account of his coolness—galloped up on his bay, shouting: 'Look at the 5th Company over yonder; see how far it has advanced.' Then another superior officer jumped in front of the men with the words: 'Is there no officer here at all?' At this instant I yelled again as if my life depended upon it: 'You men belong to the color company; Company . . . Forward!' and the spell was broken. As if on the parade ground the Grenadiers faced to the front; obediently they executed my command: 'To the attack! Carry arms . . . Forward!' and soon thereafter we again occupied our position between the 2nd and 4th Companies."

The company lost many men as soon as it entered the fight, among them its company commander; then the two shells burst in rapid succession within its ranks, and this explains the temporary panic. The company lost a total of 86 men (including officers).*

*RETZLAFF, *Aus meinem Tagebuch.*

Nothing is more contagious in the zone of danger than the example of fear or cowardice.* Appeals, threats, and intimidation are of little avail. The most effective remedy lies in developing the individual soldier's initiative, in training him to act with common sense even when his officers are absent. We should send our soldiers into battle with a reserve of moral courage great enough to prevent the premature moral and mental depreciation of the individual.

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*Some interesting proofs in support of this statement are:

The attack made by Captain Bechtoldsheim at Custozza against Italian infantry. *Oesterreichs Kämpfe*, II, p. 74.

The combats at the Mance ravine on Aug. 18th, 1870.

HÖNIG, *Vierundzwanzig Stunden Moltkescher Strategie*, pp. 170, 184, 193 and 215.

Sedan, Gen. St. W., II, p. 1243.

Wald und Ortsgefecht, p. 179. (Aymard's Division after the capture of Servigny).

LEHAUCOURT, *Campagne de la Loire*, II, p. 272. (The French Gardes Mobiles after the taking of Le Tuilerie at Le Mans).

V. DEPLOYMENTS FOR ACTION.

1. NORMAL PROCEDURE.

The characteristic tendency of modern times is the liberation of the individual from antiquated ideas and from the restraint exercised by ostensibly reactionary governmental power. The key-note of this tendency, which places individualism above collectivism, is absolute independence of the individual in municipal and national affairs, in science and art. Even tactics has been influenced to a certain extent by this tendency. Success in battle, however, will not be assured by the sum-total of a number of negative or positive individual efforts, but only by the simultaneous launching of masses controlled by a single will. Within these limits the independence of the individual is permissible, for a commander does not exact apathetic obedience, but, on the contrary, intelligent coöperation on the part of everyone, and this cannot be regulated by hard and fast rules.

Instead of laying down rules to cover all cases, the German Drill Regulations leave the leader free to dispose of his troops according to the purpose of the combat and the nature of the ground. In this he is assisted by the initiative and independent action of his subordinate leaders. Normal formations for attack and defense are requisite however, in armies in which the tactical training of commanders and subordinate leaders is deficient and where it is feared that the latter will abuse the latitude allowed them. Where such normal formations are prescribed, it is assumed that hard and fast rules are requisite for training; that the average officer cannot be expected to estimate a situation correctly and arrive at proper decisions; and that the majority

of them must be given definite rules for combat if they are to render any service at all.

Drill regulations should facilitate quick mutual understanding between leader and organization and lay down general principles for ordinary situations, for combat tasks, and for formations, but should not, by their rules, direct the actions of a leader from the very beginning into definite grooves. If the regulations contain a normal procedure, there is danger that it will be employed where inappropriate, and that the mental alertness of the leaders will relax and fail in war at the very moment when its presence is most vitally necessary.*

"Tactics will always vary according to the nature of the ground, therefore it is impossible to tell beforehand what might happen in each particular case." (FREDERICK THE GREAT). Whether or not a particular normal procedure is appropriate does not depend upon the terrain but solely upon the tactical situation.†

While there is considerable unanimity of opinion as to the general manner of carrying out an attack, opinions differ radically as to details. "If all the advocates of a normal attack had to describe it in words, there would be about as many suggestions as there are advocates. Which of the many normal attack schemes is the most suitable for average troops? A conference called for the purpose of investigating this point would probably have the strange result that each representative would concede that what the others desire

*"Leaders who have been trained only in the mechanical part of drill and who subsequently have to act independently, fare like the lame man deprived of his crutches, or the near-sighted man deprived of his spectacles." VON SEIDLITZ.

†It is only in cases where precisely identical situations may be presumed to exist that there can be any question of a normal procedure. The last stages of the infantry attack in fortress warfare present features of this nature and on that account a normal procedure has been formulated for it in almost all of the European armies.

is practicable but need not be done."* Anyone who thinks himself capable of evolving a normal procedure, should bear in mind that all such systems have invariably failed to fulfill the expectations entertained for them because of obstacles which could not have been foreseen during their preparation. Regulations that prescribe too many details are very apt to lead to stereotyped forms and to that which cannot stand the test of actual war. So far every war has had surprises in store for the troops and this will be equally true in the future. Troops will be able to find a way out of such situations only if they have been taught to follow the spirit rather than the letter of their regulations, if they have been individually trained and accustomed to strict discipline, and if their leaders have been taught to reflect on tactics. It is better to send troops into battle with the order, "Help yourselves as best you can," than to encumber them with combat rules of doubtful value which leave them in the lurch at the first opportunity, because the troops have not been taught to depend upon their own initiative. The consequent indecision is increased in the same proportion as the faith the troops and their leaders had in the lauded universal remedy, the normal procedure. In spite of the excellence of our regulations, we should accustom ourselves to the idea that a future war may correct their provisions.†

The enunciation of certain technical combat principles as a guide in the training of the troops is, however, far removed from laying down a stereotyped form for attack (normal attack). Every thinking officer will anyhow, consciously or unconsciously, formulate in his own mind some sort of a "normal attack", which is nothing but a firm opinion of how he thinks an attack ought to be carried out. If

*General BRONSART V. SCHELLENDORFF, *I, Betrachtungen*, etc. p. 42 *British Drill Regulations*: "Although a normal attack is apparently capable of being changed to suit the various situations, the continual practice of it leads to a stereotyped formation, to lack of skill and mobility. The disadvantages coupled with a normal attack are not apparent in time of peace, but in war they will make themselves felt through losses and failures."

†Major VON HÜLSEN, *Schema oder Selbständigkeit?* (Berlin, 1906).

such combat regulations are called "drill attack" (*Schulangriff*), many of the objections advanced against the normal attack are eliminated. Such definite provisions facilitate in a great measure the intercourse between leader and troops.

"Instructions as to what to do in battle," says Clausewitz (*On War*, II), "must not be taken for more than they are; they should not be regarded as hard and fast rules or systems, but merely as good general forms which individual judgment can utilize as is most suitable. . . . By means of a uniform method, commanders attain skill, precision, and confidence, the possession of which qualities on their part will make the whole machine run easier. . . .

"The drawback is that the habit of acting in a certain groove tends to become fixed and thus antiquated while the attendant circumstances imperceptibly change, and this should be prevented by enlightened and thorough criticism. When, in the year 1806, the Prussian generals (Prince Louis at **Saalfeld**; Tauenzien on the **Dornberg** at **Jena**; Grawert in front of and Rüchel in rear of **Kapellendorf**) without exception came to grief by employing Frederick the Great's system of tactics, it was due not merely to the fact that they had gotten into a certain groove of acting which was out of date, but to the most dire poverty of resource to which a fixed system of tactics has ever led. Owing to this incapacity of thinking for themselves, they involved Hohenlohe's army in such ruin as has never before or since overtaken any army on the battlefield."

General von Boguslawski* demands that the conduct of the attack be regulated by precise instructions both on the drill-ground and in action. He states: "The many different methods of dealing with even the simplest cases, unquestionably evident in the army at the present time, are an evil calculated not only to train but also to confuse the soldier and the subordinate leader. Precise regulations are by no means incompatible with adaptation to the varying features of the terrain in a given case, and will infuse unity and certainty into offensive movements. A normal formation must be prescribed, but it should be flexible."

Elsewhere he makes the following statement in regard to a normal attack: "I believe that the normal attack should be regarded as the basis of troop training—a solid foundation for further development. In carrying out the spirit of this procedure, further work should be done on varied ground. This spirit aims at the unity of the attack. The formations taught on the drill-ground should be retained as long as possible. The training of officers and men must be such, however, that they will deviate, whenever necessary, from these normal formations. But if the formations, as well as the training and drill, are truly practical and adapted for war, departures from the scheme laid down in the regulations will be insignificant. This, briefly, is my idea of the normal attack or uniform

**Taktische Darlegungen*, p. 51.

procedure, which not only does not have a detrimental effect, but, on the contrary, is absolutely necessary in order to facilitate the work of the higher leader."

General von Scherff states:*

"It would contribute to clearness and to proper division of responsibility if the regulations would definitely prescribe:—

"1. That only the superior commander who makes dispositions for battle according to his own judgment, be charged with assigning appropriate missions;

"2. That the subordinate leader, charged with the execution of a mission, determine, by an independent choice of any expedient provided by the regulations, the formation in which his organization is to carry out the task assigned; and, finally,

"3. That the subsequent conduct of such an organization be governed by a definite normal procedure, familiar to the men from the drill-ground, so as to ensure mutual coöperation of its component parts."

2. CONCENTRATION, DEVELOPMENT, AND DEPLOYMENT FOR ACTION.†

Column tactics, which influenced us even after the Franco-German war, required that troops be concentrated, prior to an action, from the narrow route column into a broad combat formation. This tedious systematic **concentration**‡ was invariably employed before entering an action, except when, in critical situations, companies and battalions had to be launched into the fight directly from route column. The commander of a force could reduce the time required for going into action only by approaching the field of battle in assembly formation.¶

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*_Einheitsangriff oder individualisierter Angriff_, Berlin, 1902.

†_Aufmarsch, Entfaltung, Entwicklung._

‡"By _concentration_ is meant the passage from route column to a broader close order formation. It is employed for the purpose of decreasing the depth of a column and for assembly." (Par. 315 German I. D. R.)

¶Examples: The approach of the IInd Army to the battlefield of Gravelotte, see _Taktik_, III, p. 305.

The advance of the Ist Army from its cantonments toward the Bistritz to the battlefield of Königgrätz was a mistake. The army first approached in route columns, then concentrated, again formed route columns, and finally concentrated for action. v. LETTOW-VORBECK, II, pp. 407 and 480. From what I know of the terrain the advance should in this case have been made in assembly formations.

Valuable time was thus lost. Even when the situation was not pressing, the leader was obliged, for example, to allow a regiment having a depth of 1200 m. to close up to a depth of 100 paces. When this had been done, he was forced to wait until thin skirmish lines gained a proper distance to the front. The rear elements were able to follow only when the skirmishers had gained a distance approximately equal to the former depth of the entire column. Such a concentration is only proper however, when the commander wishes to launch his troops subsequently in several directions. Advantage should be taken of every opportunity for decreasing the depth of the column (by forming column of sections).

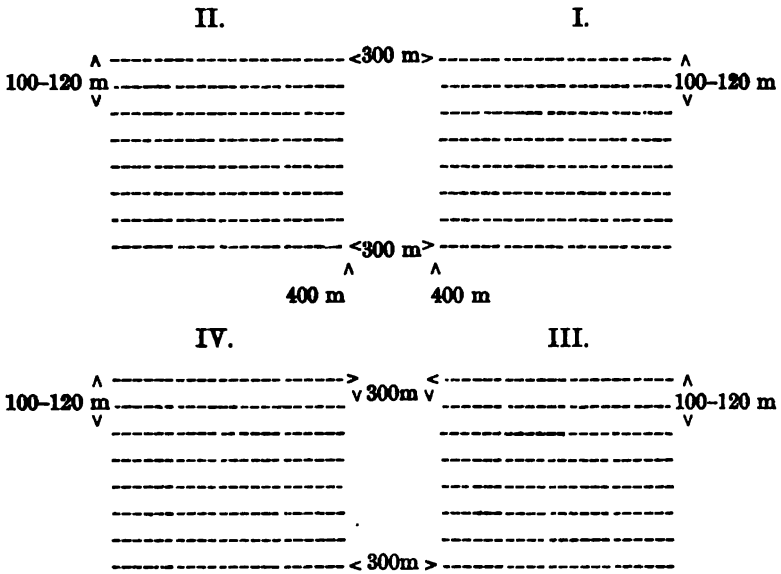
The advance of large bodies of troops presents no difficulties even in close country, if, as recommended by the author,* the battalions in route column are placed abreast of each other and are permitted to go around obstacles and take advantage of the cover available. However, even at long ranges, troops in such formations present favorable targets to hostile machine guns and artillery.

The British were surprised in close order formations at **Magersfontain** and **Colenso.** In subsequent engagements, in order to avoid this, their infantry, when still a great distance away from the enemy, took up an attack formation which permitted only movements directly to the front (at **Poplar Grove,** for example, this was done when 10 km. from the enemy). An advance in such a formation was possible only because the plains of South Africa presented no obstacles, and because the British had only to hold the enemy who stood passively on the defensive. Each brigade formed its four battalions into an open double column with a front of 2000 and a depth of 800 m., the distances and intervals between battalions being 300—400 m. Each battalion deployed from this column so that its eight companies, each in a thin line (with 2 and finally 20 pace intervals between the men), followed each other at a distance of 100—120 paces. The advantage of having troops in hand so that they can be used in other directions than straight to the front, had disappeared.

*See *Taktik,* III, p. 307.

The Formation of a Brigade of Four Battalions of the 6th Infantry Division

during the advance on **Poplar Grove** on March 7th, 1900. Front about 800 m., depth, 1800—2000 m.



When an engagement is expected, the different elements, each in route column, are directed upon their several objectives, i. e., the column is *developed for action.* This is done because it is necessary to gain a start over the enemy in deployment and advantageous to move in route column. Thus a **development for action** (*Entfaltung*)* is nothing but an extension of front accomplished by breaking up the original route column into a number of separate columns. The latter march on diverging lines and can generally remain in route

*The German I. D. R. make a distinction between extension of front, "development for action" (*Entfaltung*, pars. 315 and 466), and "distribution in depth" (*Gliedern*, pars. 287—291 and 427). The term "to form for attack" (*Auseinandersiehen*, par. 241), means that troops are given a combat formation both as regards frontage and depth.

column. Deep column should not be formed unless an immediate extension is not anticipated. During the development for action, preparations should be made providing for the necessary depth of the combat formation.

When the necessity for engaging can be foreseen, the concentration into an assembly formation should be avoided, since it generally entails a loss of time and energy, and the development for action chosen instead. (Par. 315 German I. D. R.). The latter has the additional advantage of affording a higher degree of readiness for action without letting the troops get out of hand. It should be practiced not only from route column but also from assembly formation.*

The development for action should begin as soon as there is danger of getting under effective artillery fire. The length of time required for going into action may be reduced by shortening the route column (by concentrating the troops into deep column); by forming several route columns abreast, unless column of sections has already been formed; by clearing the roads of troops; by marching across country; by indicating beforehand on which side of the infantry the artillery is to be brought up (pars. 315—323 German I. D. R.); and, finally, by directing the heads of the various elements upon their respective objectives. (Development for action).

In the Austrian regulations, the development for action is not so clearly emphasized: "A concentration preceding the attack in rencontres is permissible in only those exceptional cases when it becomes apparent, during the preparatory stage of the action, that the enemy has a visible start in deployment." When time is not pressing, the regulations prescribe a concentration for action and, simultaneously therewith, such a grouping of the principal units (if possible out of range of the effective fire of hostile guns, and well concealed) that the attacking troops need move only straight to the front. A more extended formation is taken up when the zone of hostile artillery fire is reached. The march to the battlefield is discussed in detail by the French regulations: In the first place, in order to take advantage of cover and to keep the roads clear for artillery, it will be necessary to leave the road and to advance across country. This will,

*See the defeat of the Russian Reserve Brigade under Orlov on September 2nd, 1904, at Liao Yang, in *Angriffsverfahren der Japaner*, by von Lüttwitz.

as a rule, result in widening the front of the advancing force, even though this be only to the extent of placing columns abreast of each other. Hourly halts are to be made, so as to give an opportunity for replenishing ammunition and time for reconnaissance. Small columns are preferred in woods and in close country and larger columns on passable ground. Attention is specially called to the danger to which troops are exposed when surprised in defiles by hostile fire. This march to the battlefield is followed by a concentration of the troops in concealed and protected positions.

The **deployment for action** (*Entwicklung*) consists of forming the troops for battle and includes the extension into line of skirmishers. As a rule, the deployment follows the development for action, but may be made directly from route column or from an assembly formation.

It is impossible to define clearly where the development for action ceases and where the deployment begins. The formation of a line of skirmishers to cover a route column does not constitute a deployment. There is no room for doubt that the regulations have in mind the rencontre, in which the passage from route column to skirmish line proceeds naturally and smoothly. In attacking an enemy prepared to defend a position, the procedure is much more cautious. In this case the force which has been developed for action is withdrawn as much as possible from the view and the fire of the enemy (par. 367 German I. D. R.), and led forward from cover to cover. (Par. 369 German I. D. R.). Even in situations in which haste is required, it is a good plan to follow the procedure laid down by the regulations, viz: "First direct the troops upon the proper objective, then give them a suitable formation."

An analysis of the question as to whether an immediate launching of troops into action is necessary (5th Infantry Division at **Vionville**) or whether they should first be regularly concentrated (6th Infantry Division at **Vionville**) is of special interest. The concentration of the Ist Prussian Army Corps at **Waterloo,** and of the 5th Bavarian Infantry Brigade at **Nehweiler (Wörth),** almost in rear of the French, is justly criticised. At **Nachod,** the Austrian brigades, owing to their time-consuming concentration, lost an opportunity of throwing the weak Prussian advanced troops from the heights south of Wysokow, while the latter were reinforced by

parts of the main body which arrived by half-battalions. This reinforcement, while made in driblets, was, however, sufficient.

During its march to the battlefield of **Gravelotte**, the 3rd Infantry Division concentrated at Buxieres for the purpose of cooking. Then it formed again in route column, concentrated once more south of Rezonville, and from there moved on in echelon formation. The concentration of the 28th Infantry Brigade on August 6th, 1870 (**Spicheren**), was still less justifiable. About noon, when the head of the brigade reached the exit of the Kollertal Wood at Raschpfuhl, it received orders to cross the Saar. Upon receiving this order, the five battalions present concentrated, unfurled their flags and then marched across country to the railroad bridge of Mattstall. In order to effect a crossing, route column had to be formed again. The delays which occurred here led the parts of the force which had crossed first, to throw themselves into the fight.*

3. THE BATTALION, THE REGIMENT, AND THE BRIGADE.

When part of a larger force, the battalion may be broken up into companies either by directing the latter upon their respective objectives, or by forming for attack by command.

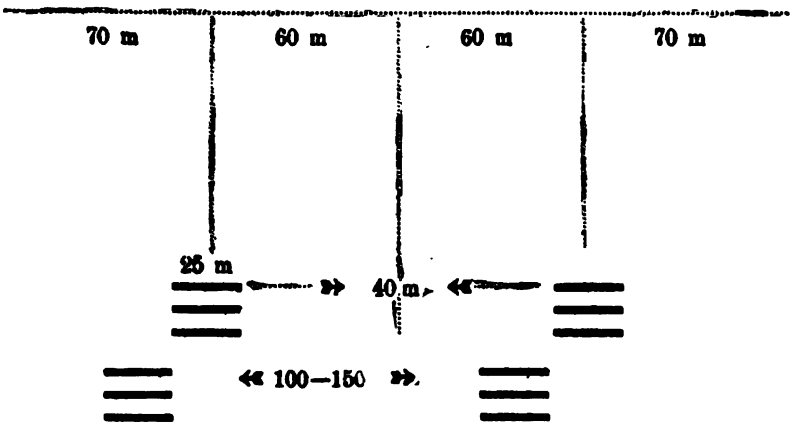
When forming for attack by command, the front, the base company, intervals, distances, and the relation of the companies to each other must be indicated. The intervals should be sufficiently large to permit the companies to move unhampered, and so maintained that irregularities of marching will not be communicated from one to the other.

A space approximately equal to the front of a platoon will suffice for this purpose. Thus the interval between companies at war strength would be 150 paces, and between companies at peace strength 100 paces. Intervals may be increased or diminished when necessary so as to enable the troops to take the fullest advantage of cover. The same holds true for distances. For rules in regard to the distance between the second and first line, see p. 121, supra. When a battalion has formed line of companies at long range from the enemy for the purpose of reducing the effect of the hostile

*Geschichte des Regiments Nr. 77, p. 51.

fire, distances should be diminished to facilitate the transmission of orders.

When the battalion is acting alone, the intervals depend upon the purpose of the combat. In the fights around Mukden, some of the Japanese battalions, stationed at points where the decision was not sought, were each assigned a front of 800 m. In these cases the four companies of each battalion had to be deployed abreast of each other at large intervals.



It is impossible to prescribe fixed forms of deployment for particular situations. In each case the formation of the battalion depends upon the situation, the purpose of the combat, and the nature of the ground, the battalion commander having the option of going into action in one, two, or three lines.

Moreover, the formation depends upon whether—

1. The battalion is acting alone or as part of a larger force; and whether one or both of its flanks are resting on impassable obstacles;

2. Whether it is fighting a decisive or a containing action; whether it is to attack or to stand on the defensive;

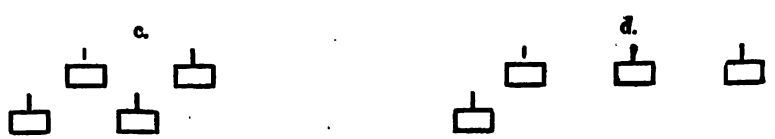
3. Whether it is to prepare the attack by its own fire

or is to take advantage of the preparation effected by other troops; and, finally,

4. Whether or not it has to fight at night.

A battalion acting alone, whose flanks are not resting on natural obstacles, will, as a rule, place entire companies successively into action so as to retain complete organizations for other purposes. It will seldom be proper for the battalion to form for attack in the regular manner. When this can be done the battalion should form in three lines in conformity with its task of initiating, carrying out, and deciding the fight. In this case the leading company is reinforced by the second company as soon as the situation has become sufficiently clear. More frequently, the battalion commander will send only a single company into action, retaining the others for the time being under cover.

The **advance guard battalion** of a regiment will, as a rule, be compelled to develop considerable fire in a *rencontre* (par. 357 German I. D. R.), in order to check the advance of the enemy, and for this purpose it will frequently place two companies into action at once. But since the battalion commander cannot count upon reinforcements and, moreover, as he does not know on which flank the combat is subsequently going to develop, he will provisionally retain the other two companies in rear of the center, or echelon them in rear of both flanks. (See "a" and "b" above figure).



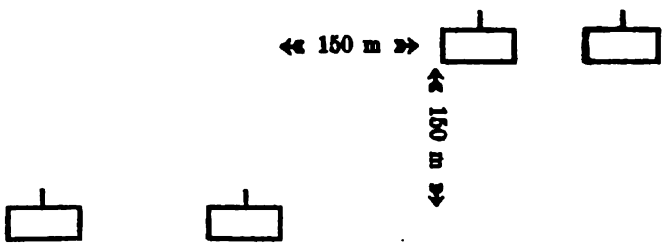
In a **containing action** one should endeavor to employ few rifles but, on the other hand, expend much ammunition, and keep supports and reserves far in rear so as to minimize the losses. If the force is to deploy first of all only for fire action, but is later to participate in the decisive attack, it will be advisable to place two companies in the first line, one in the second, and one in the third. The companies in the second and third lines will then be less exposed to hostile fire, and the battalion commander will be able, by first launching one and then the other company, to exercise an influence on the course of the action during a longer period than would otherwise be possible. (See "b").

When a battalion is fighting as part of a larger force, and when both its flanks are secure, it will need only supports for feeding the frontal attack (par. 289 German I. D. R.) and can cover a greater front. A reserve may either be entirely dispensed with, or made very weak.

When only one flank of the battalion is secure, the threatened flank should be protected by echeloning the supports and the reserve in rear of it. In this position, these echelons are not so apt to be bullet-stops as when they are placed in rear of the center. Besides, they can more easily execute enveloping movements and can take a hostile flank attack in flank. When both flanks are in the air, only the most essential precautions should be taken on the one flank, while on the other everything available is united for the decisive attack.

In **defense,** three companies can sometimes be taken into the first line for the purpose of developing a strong fire,

while the fourth company is held in rear of a threatened flank or in rear of the center. (See "d"). When it is desired to employ the reserve offensively, only one or two companies are placed in the first line, the others being held in reserve in rear of the flank which is to take the offensive. Interval and distance increase with the size of this reserve.



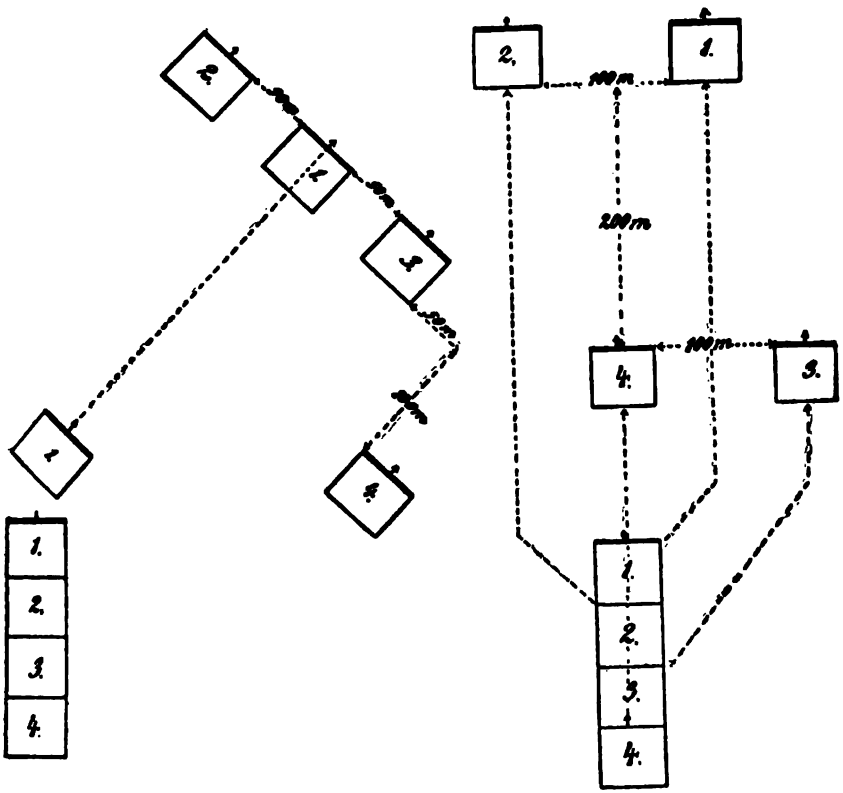
When a battalion from the reserve is called upon to make an immediate attack which has been prepared by the fire of other troops, all its companies may be taken at once into the first line. In this case the battalion may be formed for attack with its companies at close intervals. This might also be a suitable combat formation for night operations. All these formations are subject to change however, as soon as the proper utilization of cover makes it necessary.

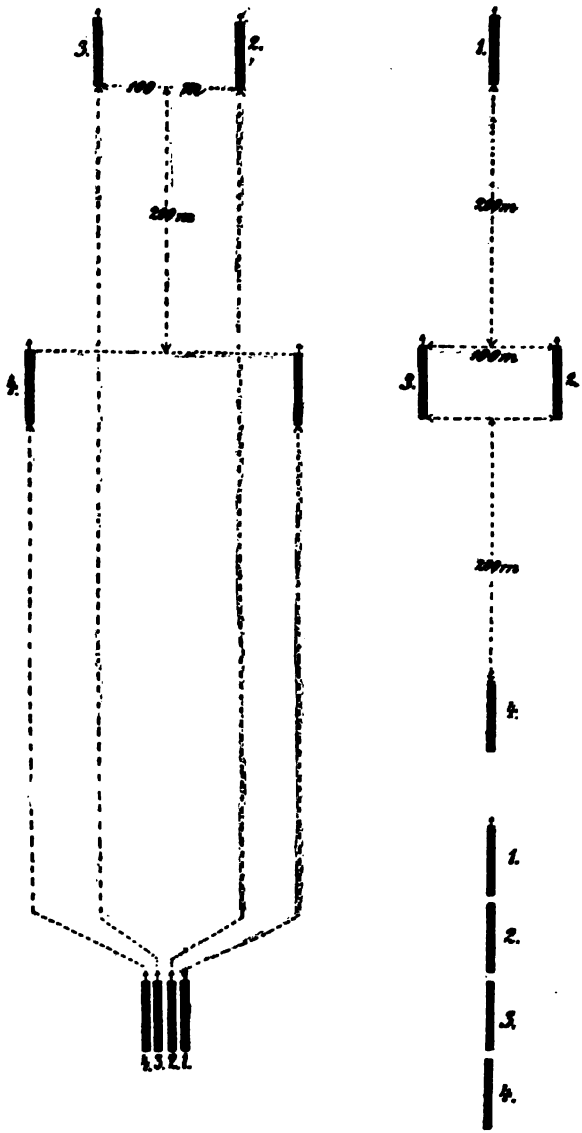
The general principles stated for a battalion are also applicable to a **regiment.** The regiment may either be directly formed for attack, or the heads of the battalions may be deflected toward the points where the deployment is to take place. An interval of 300—400 m. between heads of battalions is best calculated to facilitate the subsequent deployment. The distances depend upon the nature of the ground and the purpose of the combat.

The regimental commander assigns tasks to his battalion commanders, but leaves the latter entire freedom of action in regard to the formation to be taken up and the manner of deploying. He should interfere with companies only in ex-

ceptional cases. Such interference is justified only when the conduct of subordinate leaders threatens to impair unity of action in the combat and when time is lacking to observe the proper channels in communicating an order.

Methods of Forming a Battalion for Attack.



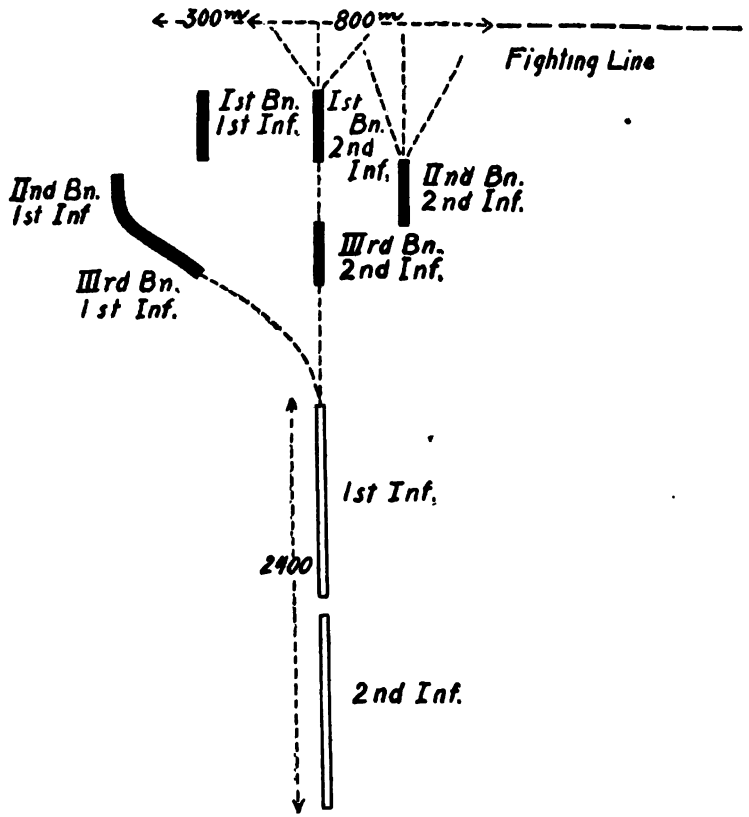


In developing the **brigade*** for action, the depth of

*For historical references in regard to the importance in action of the brigade, see essay published in *Jahrbücher für Armee und Marine* (August-September number of 1877) entitled, *Die Infanterie-Brigade in ihrer Entwicklung aus der Brigade von 1812.* In regard to the employment of the regiments in line or in echelon, see MOLTKE, *Kritische Aufsätze zur Geschichte des Feldzuges von 1866.* MOLTKE'S *Taktisch-Strategische Aufsätze,* p. 99, et seq.

column begins to exert an influence. Every concentration of the brigade retards its entry into action. If the longest distance to be covered in developing the brigade is assigned to the leading element of the column, the march into action will be accelerated.

When an infantry brigade approaching the battlefield is to prolong the flank of the fighting line, its entry into action



might be hastened, perhaps, by letting the rear regiment continue the march in the original direction while the leading regiment takes the longer route. The rear regiment would then be abreast of the leading one after about 15 minutes. If the battalions are subsequently developed on radiating lines,

the development of the whole force will, after a few minutes, have progressed far enough to permit a deployment of skirmishers.

When the brigade takes up a combat formation, each regiment is assigned a separate task (attack of a point, or defense of a section). If the tasks assigned are definite and harmonize with each other, mutual coöperation will be assured. The brigade commander ordinarily sends his orders to the regimental commanders, but, when circumstances (haste, correction of errors) compel him to depart from this rule, he should inform those officers of the action taken. In a brigade consisting of two regiments, its commander, in order to be able to influence the action, will be compelled to retain at least one battalion as a reserve.

Brigades of three regiments* (each of three battalions) have an advantage in this respect. But if such an increase in infantry units were contemplated, it would be better, for reasons that will be given later on,† to form the additional troops into a third division in each army corps.

Base Units.

The possibility of regulating the movements of a body of troops by means of a base unit, depends upon a number of preliminary conditions which will seldom be fulfilled in war:

1. *The leader of the base unit would have to remain unharmed to the very last.* If he were disabled the command of the unit would devolve upon the next in rank who would perhaps not join it in every case.

2. *The fresh organization which imparts the impetus necessary for a further advance, would have to maintain the*

*The British division consists of twelve battalions formed into three brigades.

In the United States the three unit organisation is most clearly marked. The division consists of three brigades, each brigade of three regiments, and each regiment of three battalions. The battalions have a strength of only 400 men.

†*Taktik* (*Kriegsgliederung*), III, p. 81, et seq.

direction after the original base unit had ceased to exist on account of the mixing of organizations.

3. *The base unit would have to encounter less difficulties during its advance than the other units of the force.* If the base unit were to encounter greater difficulties than the other units, this might serve as an excuse for reducing the rate of advance. In attack, the organization nearest the enemy, in other words, the one that is led better and more energetically than the others, is quite naturally charged with maintaining the direction. Moreover, this organization will be able to facilitate by its fire the advance of the elements in rear.

The designation of a base unit* or unit of direction on the battlefield cripples the energy of an entire line and the initiative of the individual in favor of uniformity of movement. A base unit is only profitable in night operations, in crossing unfavorable ground (woods), and in bringing the fighting line up to the effective zone of hostile fire. "With the entry into action, the importance of the base company gradually decreases as the demands made by the combat increase". (Par. 242 German I. D. R.). In all other cases, it is better to indicate either the objective on which the troops are to march, or the flank toward which they are to maintain connection.

A *change of direction* of march is executed by wheeling or turning with the subordinate units toward the new front. (Par. 185 German I. D. R.). A *change of front* is effected in the same manner. With long lines, echeloning and movements by the flank will result, which can only be rectified gradually by issuing appropriate orders. When skirmishers have been deployed in a wrong direction, or when a deploy-

*"A unit may also be designated upon which the others have to regulate their movements without thereby being curbed in their endeavor to advance (base unit of combat)." (Par. 371 German I. D. R.)

In France units of direction are prescribed (*la direction est confiée aux unités qui suivent les chemins ou les lignes naturelles du terrain*), but their duties are not given in detail. Units of direction are also prescribed in Austria.

ment in another direction becomes necessary after the conclusion of a combat, it is advisable to deploy a new line in the desired direction, from the closed bodies still available, and to withdraw, at the same time, those parts of the former skirmish line which are no longer necessary.

Examples of Changes of Front.

1. Engagement at **Helmstedt**, on July 25th, 1866. The 20th Infantry had to deploy to its left rear after its successful attack on the Utting Hill.*

2. The battalions of the XIth Army Corps wheeling toward the **Niederwald** after crossing the Sauer (battle of **Wörth**).†

3. The wheel executed by Kottwitz' Brigade during the battle of **Loigny-Poupry** (2nd Dec., 1870). (This is also cited as an example of the conduct of a counter-attack made by the defender). Toward noon the advance guard of the 17th Infantry Division held **Lumeau**. The 33rd Brigade, its battalions in double column, was concentrated south of **Champdoux**. The division commander retained two battalions as a reserve and ordered Major-General von Kottwitz "to execute a quarter wheel to the right and to form his command for attack in the general direction of Loigny," for the purpose of relieving the pressure on the Bavarians defending **Schlosz Goury**. The attack was directed against the French Division Jauréguiberry, which was attacking Schlosz Goury. This division first came under fire at 3—400 m. and then approached to within about 150 m. of the defenders' position; strong reserves followed in rear of its right flank, but otherwise nothing was done to protect the right.

By wheeling at once to the right, the right wing of Kottwitz' Brigade would still have struck the eastern garden wall of Schlosz Goury, and, as Loigny had been indicated to the general as the objective, a fan-shaped extension of the brigade, precluding mutual coöperation, would have been unavoidable. The general had fourteen companies at his disposal and decided to advance in a southerly direction until his second line overlapped the most advanced hostile line, so that the attack as planned would have struck simultaneously both the first and second lines of the enemy. The slight loss of time involved caused the general no uneasiness, as he could carry out his intentions without interference beyond range of the fire of the enemy, whom he could observe during the entire movement. The brigade formed for attack, during its movement to the south, when about 1200 m. from Goury. The general, who was on the right flank, halted the brigade after it had advanced far enough, and wheeled it to the right.

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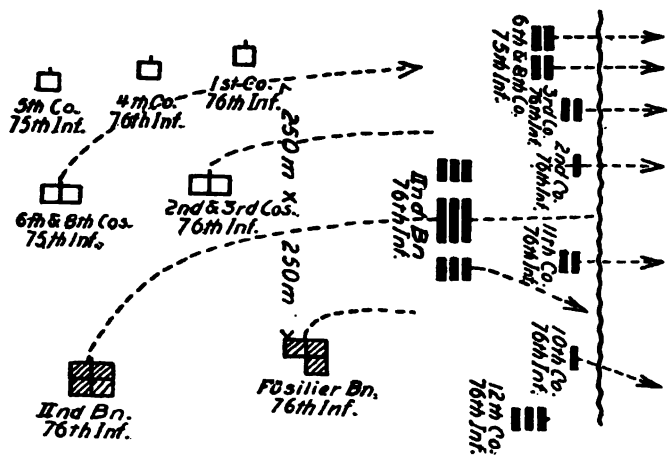
*_Geschichte des Regiments Nr._ 20, p. 54.

†_Gen. St. W._, I, p. 254, sketch p. 262.


5th Co. 75th Inf.
4th Co. 76th Inf.
1st Co. 76th Inf.
250m
6th & 8th Cos. 75th Inf.
2nd & 3rd Cos. 76th Inf.
I. Bn. 76th Inf.
250m
6th & 8th Co. 75th Inf.
3rd Co. 76th Inf.
2nd Co. 76th Inf.
11th Co. 76th Inf.
10th Co. 76th Inf.
12th Co. 76th Inf.
II. Bn. 76th Inf.
Füsilier Bn. 76th Inf.

As the second line overlapped the first, the Füsilier Battalion of the 76th Infantry had to shorten its step until the 2nd and 3rd Companies of the same regiment had come abreast and until the 6th and 8th Companies of the 75th Infantry had also joined the line. The center half-battalion (2nd and 3rd Companies of the 76th Infantry), the unit of direction, was ordered to march on the church spire of Loigny. All the units of the force, with the exception of the IInd Battalion, 76th Infantry, at once deployed lines of skirmishers. The 1st and 4th Companies, 76th Infantry, and 5th Company, 75th Infantry, covered the left flank and turned toward Ecuillon. Of the eleven companies launched in this flank attack, six were in the first line (approximately 1100 rifles on a front of 800 m.), and five in the second.

The bulk of the second line, in an endeavor to close with the enemy quickly, joined the firing line when 400 m. from the enemy. The attack came as a complete surprise to the French; their lines were taken in flank, and all their attempts to form new defensive lines to oppose the onslaught of the Hansards proved unavailing. The dense, unwieldy masses of the French were more and more crowded together by the uninterrupted advance of the Hansards and offered good objectives to the German marksmen. The advance of the brigade was supported by the artillery in position near Lumeau. This artillery followed the brigade to Ecuillon.

The Hansards traversed a distance of 3500 m. during this attack. The right wing and the bulk of the 2nd and 3rd Companies, 76th Infantry, which had been detailed as the unit of direction, with orders to march on the church spire of Loigny, strayed to Fougon; the left wing penetrated into Loigny.*

4. The advance of six battalions of the IIIrd Army Corps against **the Forbach Hill (Spicheren).**†

*See HÖNIG, *Volkskrieg*, IV, p. 80; also KUNZ, *Loigny*, p. 105.

†*Gen. St. W.*, I. p. 356.

4. DISTRIBUTION IN DEPTH AND FRONTAGE OF COMBAT FORMATIONS.*

The infantry combat is decided by the combined action of long firing lines. Retained forces, not launched against the enemy for the purpose of crushing him, exert no influence whatever on the decision, since they only increase losses without contributing to the fire effect. In the battles of the past, distribution in depth at the decisive stage of the combat (unless necessary as a measure of precaution, in securing the flanks, for example), was only permissible so long as the short range of the weapons allowed reserves to be kept in readiness so close to the firing line that they could assault *en masse* at once and without any diminution of their strength. The deciding factor, which rested in retained reserves during the Napoleonic era, lies at present in the firing line.†

Distribution in depth *is, therefore, only a means to an end; an expedient made use of to maintain a dense firing line permanently at a constant strength; to give the firing line the impetus for the assault; to protect it against a reverse; and to secure its flanks. Victory is assured only by the simultaneous employment of superior fighting forces. A force should go into action in a deep combat formation, but it must extend its front during the fight.* To launch an insufficient number of troops for combat and to reinforce them gradually is a fatal error, as we are thereby compelled to fight a superior force continually with an inferior one, without being able to take advantage of the superiority which we may actually possess.

The Russian attacks in the battles around **Plevna** are very instructive in this respect. On July 30th, 1877, the **Grivica** intrenchments were

*See *Taktik*, V, *Gefechtslehre*, p. 88.

†The French still entertain a contrary opinion.

attacked by two columns consisting of nine battalions. The Ist and IInd Battalions of the 121st Infantry succeeded in reaching the trench, but then the attack failed. The IIIrd Battalion then attacked, with a similar result. Thereupon the IInd and IIIrd Battalions of the 123rd Infantry were launched, but these also only succeeded in reaching the edge of the ditch of the trench. The attack of the left column proceeded in a similar manner, likewise that made by the reserves. An attack made simultaneously by the entire force undoubtedly would have been successful.*

On September 11th, 1877, after the attack made by the 63rd and 117th Infantry Regiments on the **Omar Bey Tabia** had been repulsed, the 64th and 118th Infantry Regiments of the IVth Army Corps, and the 31st Infantry Division of the IXth Army Corps (the last mentioned force was not under the orders of the commander of the IVth Army Corps) were placed in readiness for a renewed attack at 3 P. M. In spite of the heavy losses (42 and 49%) and the fact that the failure of the first attack had demonstrated that such a small force was insufficient for taking the Turkish work, only two regiments were again sent forward to the attack (in other words, 6 battalions instead of 18). When this assault had also been repulsed, and one regiment from the reserve had in addition been thrown in, 6 battalions of the 15 still intact, were again sent forward, but they likewise failed to take the work. A regiment began its attack only when the preceding one had been repulsed with loss. The 24 battalions lost 115 officers and 4319 men. A timely reinforcement by troops in reserve would have averted a reverse at any rate, and a simultaneous employment of adequate forces would have assured the success of the Russian infantry.†

The same thing occurred at **Gorni-Dubniac.** As the Russians, who advanced on a broad front, did not attack simultaneously, the weak garrison of the trenches was able to concentrate its fire on the isolated attacking groups which followed each other.

The same peculiar feature, namely, small frontage with insufficient fire power and strong reserves, was frequently observed during the battles in the **Russo-Japanese war.** On the left flank, at **Wafangu** (15th June, 1904), the 1st East Siberian Rifle Division advanced with one battalion of the 2nd Regiment and one of the 3rd in the first line, with four battalions in the second line, and with three battalions of the 1st Regiment in the third line. A full development of the fire power of the division did not take place at all.‡ The 2nd and 3rd Regiments, in all about 6000 men, lost 49 officers and 1464 men. The 1½ batteries attached to the division were shot to pieces in a short time and fell into the hands of the Japanese.

**Russisch-Türkischer Krieg* (*Gen. St. W.*), German Translation, III, pp. 254 and 264.

†KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg*, I, p. 211.

‡LÖFFLER, *Russisch-Japanischer Krieg*, I, p. 56.

Distribution in depth is necessary during the preparatory stage of the fight, as it enables the commander to meet unexpected developments in the situation. Moreover, it is justifiable so long as the information in regard to the strength and intentions of the enemy is insufficient. When reconnaissance work is not thoroughly performed, the force may be obliged to deploy in a direction other than the one originally chosen. This will be difficult to do as changes of front and movements by the flank can only be made when the front is narrow. Moreover, after a force is once deployed within the zone of hostile fire, it is committed to the direction chosen and can only move straight to the front. Considerable changes of front can only be executed by the lines in rear. The troops held in rear are to reinforce the firing line and to increase its density to the maximum at the decisive moment. As the losses are smaller in defense than in attack, a force can cover a broader front and keep its supports in closer proximity to the firing line in the former than in the latter case, especially if it was able to strengthen its position. The reserve, however, should be kept at a greater distance from the firing line than in attack, in order that it may retain complete freedom of movement—in covering the retreat, or in making a counter-attack—and may not be involved in the fire fight.

The reserves of the attacker are to protect the flanks, give the impetus for the assault, serve as a force upon which the attacking line can rally, and cover the re-forming of the troops after a successful attack. The several echelons of the attack formation, except the small fractions immediately supporting the firing line* and covering its flanks, should have become merged with that line by the time the decisive moment of the combat arrives. The commander who takes up an unnecessarily deep attack formation dispenses with an advantage; on the other hand, the one who prematurely de-

*The advantage of having such supporting forces in rear of the line is clearly shown in the fights of the 18th Brigade at Wörth. KUNZ, *Kriegsgeschichtliche Beispiele*, 14, pp. 110, 129 and 172.

ploys in force, exposes himself to grave danger. *The troops should be sent into action in a deep combat formation, since the firing line is to be fed from the rear until the decisive moment arrives, but every available man should be thrown in for the assault.*

Distribution in depth and frontage are interdependent; the greater the frontage, the less the distribution in depth, and vice versa. In every deployment for action the following question awaits solution by the troop leader: "How deep ought the formation to be and how great an extension of front is allowable." The result of the combat depends in many cases upon a happy answer to this question. Broad combat formations have great initial energy, facilitate turning and flank movements, but their energy is not constant when the means are not available to replace casualties. In addition, the difficulty of leading, the danger of the line being penetrated, and the weakness of the flanks grow apace with the extension of front. Distribution in depth makes it possible to initiate the combat with a part of the force and to get information of the situation; to fight the action with another part of the force in accordance with this information; and, finally, to bring about the decision and reap the fruits of that decision with the third part. A deep combat formation enables the leader to exercise a constant influence on the course of action; it gives him the means with which to execute turning movements or to repulse them—something which would be entirely impossible, or, at any rate, only possible under great difficulties, with troops deployed in the first line. As only a limited number of rifles can be brought into play in a deep combat formation, it is obvious that this is an element of weakness of which an opponent deployed on a broader front, may take advantage.

Although the danger of going too far in distributing a force in depth is not inconsiderable, this is, at any rate, a smaller error than the opposite extreme, that of deploying troops, from the very start, on too broad a front.

At noon on August 6th, 1870, General von François received an order for his brigade to dislodge the hostile artillery posted on the **Roten Berg** of the **Spicheren Heights,*** it being assumed that only insignificant hostile forces were in front. The other brigade of the 14th Division was expected to be able to take part in the action in about three hours. When the attacking force was 2000 m. from its objective, the IInd Battalion, 74th Infantry, and the IIIrd Battalion, 39th Infantry, were set in motion against the French right flank, while the Ist Battalion and the Füsilier Battalion of the 74th Infantry were retained as a reserve. The brigade accordingly covered a front of about 4000 m. While the frontal attack on the Roten Berg was undoubtedly difficult,† this wide extension, which made all leading impossible, increased the difficulties still further. In the first place, the brigade commander led his two reserve battalions against the Roten Berg and fell finally while leading a company. The brigade was too weak to carry out the task imposed upon it. The 28th Brigade, which followed, came into action at various points of the battlefield, so that the two brigades became mixed, thus considerably increasing the difficulties of leading. At 3 P. M., the following troops were in the first line on the right wing:‡

I. Bn.	II. Bn.	1. 2. and ½3. Cos.	4. and 1. Cos.	10. 11. and 12. Cos.	½3. Co.
53. Inf.	**74. Inf.**	**74. Inf.**	**77. Inf.**	**39. Inf.**	**74. Inf.**

The following troops were in the second line:

Füsilier Bn.	2. and 3. Cos.¶	II. Bn. and Füsilier Bn.
53. Inf.	**77. Inf.**	**77. Inf.**

This admixture of organizations along a front of about 1.5 km. might have been prevented by the commander. Toward 6 P. M., a similar situation existed on the Roten Berg and at the south end of the Giefert Wald—39% companies belonging to the 12th, 39th, 40th, 48th and 74th Infantry Regiments were scattered along a front of 1600 m. It is true, the peculiar situation existing on the German side, operated against a simultaneous employment of the several bodies and a mixing of units was unavoidable, but it would undoubtedly have been possible to prevent such a complete dissolution of all units, by François' Brigade taking up a more suitable formation before the action commenced. The mistake made here

Gen. St. W., I, p. 310.

†*Gen. St. W.*, I, p. 318.

‡The units printed in heavy type belong to the 27th Brigade. The 4th Company of the 74th Infantry was separated by 2.5 km., as the crow flies, from the left flank of its battalion.

¶These two companies were separated by about 1 km. from the other companies of their battalion.

was repeated over and over again in the other preliminary combats of the campaign, and invariably led to the same result.*

The failure of the attacks made by the British brigades at **Magersfontain** and **Paardeberg** may be traced to the lack of sufficient reinforcements. At Magersfontain, the four battalions of the Highland Brigade were deployed on a front of 3000 m. and at Paardeberg on a front of 4000 m.

In deciding how many men are required to occupy or attack a position, the principal point to be considered is the effect of fire. The modern long range magazine rifle will, no doubt, enable us to defend a position with a smaller force than was possible in the past with the older less improved weapons. However, combats last longer nowadays, and the shock action of Frederick the Great's tactics is no longer practicable. The fight is carried on at longer ranges, and the tremendously costly decisive moments of the past are of rarer occurrence. As a consequence, the casualties of the whole force engaged are smaller, although, owing to unfavorable conditions, certain organizations may suffer losses quite as great as those incurred in the battles of Frederick the Great and Napoleon.† Instead of the sanguinary hand-to-hand fight with cold steel, we now have a prolonged fire fight carried on by a firing line which requires to be constantly fed by troops held in rear, who have to be sheltered as much as possible from hostile fire until the moment of their employment. This fire fight is frequently decided by psychological factors and without the troops suffering material losses.

"The duration of the combat under modern conditions," writes General Négrier,‡ "leads to a considerable mental exhaustion of the troops which is apparent in nervous lassi-

*Consult *Erste Gefechtsentwicklung des XI. Armeekorps bei Wörth*, KUNZ, *Kriegsgeschichtliche Beispiele*, 13, p. 10, et seq.

†At Wörth, the 1st Turco Regiment lost the enormous total of 93.1%, and twelve other French regiments suffered a loss of over 50%. To be sure, the losses sustained during the retreat are included in this total. At Albuera (16th May, 1811), the 57th Regiment (British) and the Füsilier Brigade lost 70%; in four hours the army of Beresford lost 25%, and of the British infantry, which originally numbered 7000 men, only 1800 remained.

‡*Revue des deux mondes*, June number, 1902.

tude. This explains the impotency of leader and troops the day after a defeat and even after a victory. This lassitude is still greater on the day of the battle. While it is true that this has always been the case, the nervous exhaustion has grown in an inconceivable manner, its intensity increasing at the same rate as the invisibility of the opponent. *The invisibility of the enemy directly affects the morale of the soldier, the sources of his energy and courage. The soldier who cannot see his enemy is inclined to see him everywhere. It is but a step from this impression to hesitancy and then to fear.* The inertia of the troops for whole days at Magersfontain, Colenso, and Paardeberg, frequently more than 800 m. from the enemy, was not caused by their losses, but by the moral depression produced within the effective zone of rifle fire. Another factor, which governs the modern combat at short ranges, the *impossibility of the commander making his influence felt in lines which are seriously engaged,* is of still greater importance. *The influence of the officers who lead these lines is also limited. They are scarcely able to direct the three or four men nearest them.* The combat depends upon the individual fighters, and there never has been a time when the personal efficiency of the individual soldier has had a greater significance." We should not forget that this change occurred during a period in which we no longer fight our battles with professional soldiers of long service, but, on the contrary, with peace cadres of our conscript armies raised to war strength by Reservists.

Another factor to be considered is the fighting quality of the opponent. In an action against an enemy who is a match for us, the necessity for distribution in depth is, of course, greater than when fighting against poor troops.

General v. Werder could with impunity oppose the newly raised levies of the French Republic on the **Lisaine** with 1.12 men per meter of front. The victory was won by this very extraordinary extension of front, which, if employed in the face of the Imperial army, would have led to defeat.*

*KUNZ, *Entscheidungskämpfe des Korps Werder*, II, p. 11.

Considerations of importance in deciding upon the extent of front to be covered by a force, similar conditions on both sides being presumed, are—

1. *Whether it is compelled to fight an independent action alone;*

2. *Whether it is fighting, from the preparatory to the decisive stage of the combat, as part of a larger body, with at least one, or perhaps both flanks secured;*

3. *Whether it has been selected to make the decisive attack against an enemy already shaken by other troops.*

In the last mentioned case a sudden effect, a short, powerful blow, is required, and the maximum frontage of all the units employed on the same line is admissible. But even a force advancing to the final assault can by no means dispense with distribution in depth; supports and reserves are needed to carry forward the firing line when it has been checked, to cover its flanks, and to carry on the pursuit (second line).

The frontage of an organization whose flanks are secure and which is acting as a part of a larger force, depends upon other troops; considerable extension of front is admissible provided the firing line is constantly maintained at a strength which will enable it to gain a superiority of fire over the enemy. "While an organization which has only one flank protected, is less restricted as regards frontage, it will have to provide for distribution in depth on the exposed flank. In this case, it is a good plan to move the units held in rear toward the particular flank (echeloning). Interval and distance increase with the size of this echelon. (Par. 290 German I. D. R.). The German Infantry Drill Regulations (par. 397) further emphasize the fact that, when well-trained infantry employs its rifles to good advantage in defense, it is very strong in front; that it can hold a position with a comparatively small force; and that, in this case, it has only one weak spot, the flank, which it must seek to protect by distribution in depth. This view is fully borne out by the recent events in South Africa and in Manchuria. Under favorable condi-

tions (deliberate defense), a battalion fighting as part of a larger force may put all of its companies into the first line, a front of 200 m. being assigned to each. The battalion can thus defend a front of 800 m. The only restriction is the requirement that the battalion commander must be able, at all times, to direct the course of the combat.

An organization acting alone which has to fight an action independently from beginning to end under varying conditions, cannot employ all of its available strength in the first line at one time. A distribution into three parts, viz., firing line, supports, and reserve, is therefore required. During the preparatory stage, the firing line should be as weak as possible, while, for sustaining and deciding the action, the reserve should be as strong as possible. As a rule, this distribution will not come into existence until the combat has begun; it must disappear again, during the subsequent course of the fight, through reinforcement of the troops that initiated the action, thus resulting in an increase of the combat front.

While the frontage is thus increased, an equal density along the entire attacking line is not produced. This is due to the fact that one will endeavor to increase the distribution in depth only at the point where the decision is sought (offensive wings), while one will seek to obtain results by a generous expenditure of ammunition at points where the enemy is only to be contained. When a broad front has to be held with a weak force, it is a good plan to post the troops in groups. Of the attack as well as of the defense it may be said, that the skillful combination of the offensive and defensive advantages of a piece of ground is a sign of good leadership. (Austerlitz). Frequently, however, after an action is over, the assault that penetrated a line is called the main attack, and the one that failed, a demonstration. An organization fighting alone will generally begin an action by deploying on a narrow front; it will protect its flanks by distribution in depth; and, finally, mass troops at the decisive point in readiness to make the as-

sault. The force making an assault in attack or a counter-attack in defense cannot be strong enough.

Another factor that must be considered in deciding upon the frontage is the task which a force is to perform, *i.e.*, whether it is to make an attack or to stand on the defensive; whether it is to fight a delaying action or is to withdraw. The object of distribution in depth is to keep the firing line constantly at the same strength; this requires stronger reinforcements in attack (owing to the greater losses), than in defense, and leads, consequently, to a contraction of the front.

The number of troops which will be required to hold a given piece of ground must be determined separately in each case. The strength of the fighting line depends upon the effect of the hostile fire. Military history tells us how many troops the leader sent into action in order to gain the victory, but it seldom gives us a clue as to the number of troops that might have sufficed in the particular case.

In deploying from route column in a rencontre, the leading battalion may be fully engaged by the time the next one arrives on the battlefield. In such cases, the tactical situation may require the employment of longer firing lines than would be deemed proper for the size of the command when making a more serious attack. (Par. 357 German I. D. R.). The assailant should then endeavor to throw the enemy, who is likewise advancing, on the defensive. The situation is similar to that in which an advance guard has to cover the main body's debouchment from a defile.

At **Nachod**, five Prussian battalions, which had only two companies in reserve, fought on a front of 2500 m. from 8 A. M. until noon.

The conduct of the advance guard of the 8th Infantry Division at **Beaumont** is worthy of imitation. In this case, the support battalion was deployed and the artillery went into position; strong detachments were retained in rear of the left wing until the main body had arrived. Likewise, a proper relation existed between frontage (4 battalions on a front of 1400 m.) and distribution in depth. According to the General Staff Account of the Franco-German war (II, p. 1045), the distribution was as follows:

First line: 4th Jäger-Battalion, which was subsequently reinforced by the IInd Battalion, 96th Infantry and the Ist and IInd Battalions, 86th Infantry.

Support for the Artillery: Füsilier Battalion, 96th Infantry.

Reserve: IIIrd Battalion, 86th Infantry.

We have already mentioned the deployment of the advance guard at **Spicheren** (p. 226 supra). In that instance the whole force was thrown in at once, whereas at **Beaumont** the deployment of the different units was coördinated and proceeded systematically. An advance guard should be able to repulse an attack and then assume the offensive without outside assistance. An example which is not worthy of imitation is the engagement of the 29th Infantry Brigade at the **Hallue.** The brigade began the fight, without being compelled to do so, and deployed its 4530 men on a front of 5000 m. The 30th Infantry Brigade (4070 men) then entered the fight and deployed on a front of 3000 m. in prolongation of the line of the 29th Brigade. If the French had made a decisive attack at this point, the 15th Infantry Division would not have been able to repulse it.

Distribution in depth, for the purpose of warding off an enveloping movement and for making a counter-attack, is more necessary in defense than in attack; besides, a greater front may be covered in the former case on account of the smaller losses. The following factors in part determine the extent of front to be occupied and the number of troops required to defend it: (1) the strength, natural or artificial, of the position; (2) obstacles in its front; (3) salient angles which can be easily enveloped; (4) the intentions of the commander (*i.e.*, whether he contemplates fighting a purely defensive combat or one including offensive action).

Delaying actions are usually fought at long and medium ranges as purely passive defensive combats and no provision is made for replacing casualties, the object of the fight being to avoid a decision. Few men should, therefore, be placed in the firing line, but these should be supplied with abundant ammunition. However, as the force desires to avoid a decisive engagement by withdrawing, distribution in depth should be provided to protect the flanks and to facilitate breaking off the action. (Par. 419 German I. D. R.). This requires that distances be great.

Night attacks, on account of the element of surprise involved, do not require great distribution in depth; as a rule, the fight is decided in a very short time by the collision of the opposing forces. However, measures must be taken to protect the flanks, to ensure victory, and to give the first line the impetus necessary to carry it forward in case it is checked.

The British attack on the Egyptian position at **Tel el Kebir** (1882) was made by only 11,000 men on a front of about 6 km. After a short fight the works were taken.

An attempt will now be made to give some approximate figures for the extent of front that may be occupied in various situations.

Assuming one rifle for every three meters of front occupied, the following might suffice for temporarily defending a line 1000 m. long:

Firing line	300 rifles
Supports (one platoon in rear of each wing)	120 "
Reserve (two companies)	400 "
Total	820 rifles

Thus 0.8 men per meter would be sufficient. This is borne out by the Boer War. With a good field of fire, even a thin firing line, provided with plenty of ammunition, is capable of bringing any attack to a standstill, at least for the time being.

A defense seeking a decision requires fighting at short ranges; the firing line must be kept constantly at the same strength; losses of about one-fifth (killed, wounded, and missing) must be reckoned with; and, finally, a reserve, consisting of about a third of the effective strength of the force, is required for making the counter-attack. The firing line is, from the outset, made as dense as possible, and echelons posted on the flanks must oppose any advance against the flanks.

The following would thus suffice for defending a front of 1000 m.:

Firing line	1000	men
Replacement of casualties	200	"
Flank protection (2 companies)	400	"
Reserve	800	"
Total	2400	men

Hence, 2.4 rifles per meter of front would be available for defense.

The defense is decided by a successful counter-attack made by the reserve, whereas the attack requires an additional force to cover and assure the assembling and re-forming of the troops. The greater force is naturally required by the attacker, who must be stronger than the defender at the moment when the assault is made. The following would be required for making an attack on a front of 1000 m.:

Firing line	1200	rifles
Replacement of casualties (½)	600	"
Flank protection	400	"
Reserve	2000	"
Total	4200	rifles

This would be equivalent to 4.2 rifles per meter of front.

These figures can only serve as a very general guide, of course, and should be considered minima.

The number of troops required for attack or defense must be determined separately for each individual case. At **Lovtcha**, 25 battalions, 92 guns, and 15 sotnias were not considered too large a force for attacking 8000 Turks with only 6 guns. At **Gorni Dubniac**, 3 infantry divisions of the Guard, with 90 guns, attacked 6 weak Turkish battalions having only 4 guns. After the first two unsuccessful assaults on **Plevna**, the Russians overestimated the strength of the enemy. Osman Pasha's force was estimated at 80,000 men, and, consequently, during the September assaults, 90,000 men and 400 guns were deemed necessary to attack barely 40,000 Turks and 60 guns.

From a consideration of the foregoing, it appears that the **maximum frontage** is justifiable, when a force whose flanks are secure, occupies a position prepared for defense, or acts as a reserve and is to bring about a decision which has been prepared by other troops. On the other hand, the **maximum distribution in depth** is necessary for a force acting alone in attack with both flanks exposed. Between these two extremes lie many intermediate degrees, and it is therefore impossible to lay down hard and fast rules for the frontage of an attacking force. The German Infantry Drill Regulations (par. 373) accordingly fix the frontage of a company in attack at 150 m. and that of a brigade of six battalions at 1500 m. It is impossible to give a definite ratio of effective strength to combat frontage. Thus, while in attack a company puts into the line about 1.3 rifles per meter of its front, the brigade employs 4 rifles per meter, and the larger units a proportionally greater number. The necessity for distribution in depth increases with the size of the force and with the number of units composing it.

In a company, for example, a platoon is sufficient to fulfill, within certain limits, all the functions of a reserve, while in a larger force the duties of a reserve are so complex that each task (protecting the flanks, reinforcing the firing line, giving the impetus for the assault, and covering the assembling and re-forming of the attacking force) must be assigned to a separate unit. Moreover, the duration of a combat, and, in conjunction therewith, the necessity of reinforcing the firing line and covering the flanks, increases with the size of the force. During protracted periods of peace, one is too much inclined to underestimate the wastefulness of a battle and the necessity for reinforcing the fighting line; one cannot understand why 5 to 6 men will not suffice, during the course of a combat, for a front wherein only one man can use his rifle. From the foregoing it follows that the frontage does not increase in proportion to the number of men. Thus, an army corps would not occupy a front four times that of a brigade, or twice that

of a division. This is best illustrated by doubling or trebling a plane area when both length and breadth have to be equally increased.*

The maximum frontage to be covered in attack by the firing line of a **company** is fixed at 150 m., in order that the density and fire power of that line may be constantly maintained during a prolonged and costly action. During shorter (*i.e.*, rear guard actions), or less costly actions (defense), it is, however, permissible to exceed this limit. The regulations by no means insist upon a literal interpretation of this paragraph, since they mention the deployment of the entire company, when it would certainly occupy a front of about 200 m. There is no disguising the fact, however, that, when extended on a front of 200 m., it is out of the question for the company commander to lead his men.

The regulations do not fix the combat frontage of a **battalion,** as it depends upon the tactical situation, and the battalion commander is at liberty to place one, two, three, or four companies into the first line. The frontage of a battalion would thus be 300 meters when making an independent attack, and not exceeding 600 meters when fighting a purely defensive action as part of a larger force, in other words, a mean frontage of 400 meters.

This is also true of the **regiment.** The combat frontage of a regiment acting alone, will, at the start, seldom exceed that of two battalions deployed abreast. From this we obtain a frontage of 600—800 m. for the regiment when it is acting independently, and a frontage of about 1200 m. when it is fighting a purely defensive action as part of a larger force.

Military history tells us that an army corps consisting of 25 battalions, acting as a part of a larger force in a deliberately planned attack, occupies an average front of 2.5 to 5 km. According to this, the frontage of a brigade would amount to about 800—1000 m., *i. e.*, to 6—7.5 rifles per meter of front.

*See *Taktik*, V, p. 46, et seq.

This limit was frequently exceeded during the **Franco-German war** according to the circumstances under which the brigade went into action and the commander's estimate of the situation. If the brigades had to cover the concentration of the columns in rear, and if the battalions came into action successively, both brigade and battalion frontages were frequently very great. The endeavor to close with the enemy as soon as possible and the desire to bring a large number of rifles into action, led to enormously increased frontages at the expense of depth. The brigades which arrived later, entered the line where other brigades were already engaged, and the result was a dissolution and admixture of all tactical organizations.

At **Colombey,** the 25th Brigade covered a front of nearly 3 km. with 28 companies, only four or five companies remaining in close order. Connecting with this brigade on the north, 22 companies, belonging to two different divisions of the Ist Army Corps, covered a front of 4 km., supported by three or four companies in close order. With such an overextension of front the offensive or defensive power of a force is, of course, crippled.

During the battle of **Amiens,** the 3rd Prussian Brigade advanced in three columns against the heights north of the Luce. On the left, six companies of the 4th Infantry advanced from Domart, in the center, four companies from Hangard, and on the right, two companies from Demnin. A battery and a troop (*Eskadron*) were attached to each column, and the right column was followed by the 44th Infantry.

The French advanced troops were pushed back without special difficulty, but at the northern edge of the timber, the brigade now found itself opposite the French main position Cachy—Villers-Bretonneux. The attack on this position began at once, and in a short time the 4th Infantry and two batteries were in action on the line East corner of the Bois de Hangard—Gentelles (5 km. long). At the same time, the 44th Infantry with one battery deployed on a front of about 2000 m. to the right of this line. The right wing of the 44th Infantry subsequently advanced to attack the trenches southeast of Villers-Bretonneux and captured them. The enveloped French left wing withdrew to the village named, and rallied on strong reserves.

This was the situation when the fight came to a standstill toward 1 o'clock P. M. The brigade fought in a thin line over a mile (four English miles) long. The reserve only consisted of three companies of the 4th Infantry, at Gentelles, and four companies of the 44th Infantry, in rear of the right flank.

A defeat was averted only by the timely interference of other troops, especially of strong artillery (76 Prussian guns against 24 French).*

*KUNZ, *Nordarmee,* I, p. 47, et seq.

The frontage of a company is definitely fixed, so as to make it easier for battalion and regimental commanders to designate combat sections; the higher leaders reckon with regimental and brigade fronts. In war, however, the numerical strength varies constantly, and it is therefore advisable not to reckon with companies, but with a corresponding number of rifles (200 on an average). The combat frontages mentioned in drill regulations only give an approximate idea of the extent of front to be covered by organizations which act as part of a larger force in an attack seeking a decision. The extent of front to be covered in other situations, under favorable or unfavorable attack conditions, requires in each case a separate estimate.

In the Boer war, we notice for the first time overextensions of front, which were undoubtedly caused by a desire to avoid the costly frontal attack.

At Magersfontain, on December 11th, 1899, the British division under Lord Methuen (7300 men) covered a front of 12 km.; and during the attack on Pieters Hill, on February 27th, 1900, the troops under General Buller (30,000 men) extended over a front of 11 km.

At Poplar Grove, 7000 Boers with 7 guns fought on a front of 17 km. (0.4 men per meter), while the British deployed 25,000 rifles, 5000 troopers, and 116 guns on a front of 32 km. (0.8 men per meter). In the engagement at Diamond Hill, on June 11th, 1900, the army under Lord Roberts (40,000 men) advanced on a front of 37 km. Such liberties could be taken only in the face of a shaken enemy who had given up all thoughts of the offensive. At Paardeberg, February 18th, 1900, the 6th Division and the Brigade of Highlanders succeeded in getting close to the enemy, but there the attack failed on account of the lack of an impetus from the rear. Even in the Russo-Japanese war the frontages were greater than those to which we are accustomed. The reason for this overextension lies in the fact that a numerically in-

ferior assailant was desirous of vanquishing the defender, and in order to accomplish this purpose, he was obliged to make an extensive use of the spade and to put all rifles into the first line.

	Jap.	Russ.	Frontage.	Per 10,000 men.*		Per m.	
				Jap.	Russ.	Jap.	Russ.
			km.	m.		men.	
Liao Yang (West and South front)	106,700	150,000	26	2600	1750	3.9	5.9
Shaho	148,000	257,000	48	3330	1980	3.	5.
Mukden (exclusive of Yalu Army)	247,000	336,000	96	3960	297	2.6	3.4

The realization that troops in fortified positions only require small reinforcements or none at all, very naturally caused frontages to be increased and depth of combat formations to be decreased. Gaps in the attacking line, provided they were kept under observation, proved by no means a disadvantage.†

During attacks it frequently appeared that the Japanese lacked the necessary reinforcements.

*According to data given by Lieut. Col. Yoda in the *Journal of the Officers' Association*, Tokio.

†At Mukden, on March 3rd, 1905, there was a gap of 7 km. between the Japanese IVth and Ist Armies, which was covered by only one infantry regiment of Reservists, two dismounted cavalry regiments, and one battalion of artillery. However, the Russians were fighting on the passive defensive in this case. The insignificant danger to be apprehended from such gaps is especially emphasized by the French regulations.

INFLUENCE OF VARIOUS RIFLES ON THE DENSITY OF BATTLE FORMATIONS.*

Rifle.	Year of the Campaign.	Battle.	Belligerents.	Per km. of the combat frontage. Battalions @ 900 rifles.	Escadrons @ 150 troopers.	Field guns.	Remarks.
Muzzle loaders.	1815	Waterloo	French	12	19	46	After Napoleon's concentration for battle toward noon.
			British	10	15	25	
	1859	Solferino	French and Sardinians	7	5	19	After the victorious advance of the Austrian VIIIth Corps to S. Martino.
			Austrians	7	2.5	21	
	1866	Custozza	Austrians	8	2.	17	
Breech loaders large caliber.		Königgrätz	Prussians	9.5	10	39	Situation at noon.
			Austrians & Saxons	10	8.5	43	
	1870	Wörth	Germans	9	5	37	
		Gravelotte	Germans	11.5	9	46	
		St. Privat	French	8	6.5	32	
Mag. rifles of small caliber.	1899	Colenso 1st battle, Dec. 15th	British	1.5		4	Including 1½ heavy guns.
	1900	Colenso, 2d battle, February 27th		2.5	1.5	7.5	Including 1½ heavy guns.
7.6 mm. against 6.5 mm. Mag. rifles.	1905. Mukden	February 20th	Russians	1	0.4	* 5	Total extension from the Liao to Tung-wha-sien. *Incl. 1 heavy gun.
				3	0.7	* 5. 5	Excl. East and West Det. *Incl. 3 heavy guns.
			Japanese	3.5	0.8	* 15.5	Exclusive of the approaching Vth army. *Incl. 2 heavy guns.
		March 3d	West front. Russians	5	0.8	† 18	Excl. of Trans-Baikal Cossack Div.
			West front. Japanese	3.5	1	† 11.6	Excl. of 2d Cav. Brigade.
			South front. Russians	1.7	0.5	† 6	
			South front. Japanese	2.2	0.3	† 5.6	
		March 7th....	West front. Russians	4.6	0.7	† 15.6	Excl. of Trans-Baikal Cossack Div.
			West front. Japanese	4	0.6	† 10.5	Excl. of Cav. Div.

† Exclusive of heavy guns.

*General Minarelli Fitzgerald, *Infanteristische Reflexionen.*

Let us now recapitulate the most important points which have a bearing on combat frontage:

1. The frontage of individual units cannot be definitely fixed, as it depends upon the situation and the purpose of an action.

2. Favorable terrain, cover, and intrenchments permit an extended front to be obstinately defended with a weak force.

3. The frontage does not increase in proportion to the size of the force.

4. An organization (company, battalion, or regiment) fighting as part of a larger force is justified in deploying on a wider front than when acting alone.

The necessity for distribution in depth increases with the size of the force and with the number of units composing it. Only the result can decide whether a narrow or a wide frontage was justified in a given case. A commander will endeavor to hold certain parts of the line with a weak force, posted in groups, while, at the decisive point, he will throw in every available man in order to gain the victory.

Provisions of Various Regulations.

Austria-Hungary. Frontage depends upon the tactical situation and the terrain. The frontage of a company acting as part of a larger force in attack is fixed at about 130—150 paces (97—112 m.). "In other situations, a greater frontage is, as a rule, permissible." The battalion acting as part of a larger force in attack, "is, as a rule, not to cover a frontage exceeding its own front when in line"—in peace exercises, 300—400 paces (225—300 m.). With companies of 200 men, 2 rifles, and in the battalion 2.6 rifles are reckoned per meter of front. "The increased fighting power of infantry, due to better fire effect, in general permits a greater frontage to be covered. This will often be taken advantage of, in order to make as many troops as possible available for the decisive stage of the combat. But this frontage should not be so great, that the requisite power of resistance is weakened, or that tactical coöperation or the attainment of the object of the combat are impaired." Further than this nothing is prescribed.

France. Nothing definite is prescribed. The combat is carried on by groups separated by intervals.

"When *an organization is acting as part of a larger force* and has to advance directly to the front against a well-defined objective, its commander may from the outset push a strong force into action, retaining a reserve only in exceptional cases. If one of the flanks of this force is in the air, it will be advisable to echelon units in rear of the flank which may be threatened. When *an organization is acting alone,* and when both flanks are in the air, a weaker line is pushed forward and a reserve is retained. . . . . "

The enhanced power of firearms permits an extended front to be held, especially at the commencement of an action. The only restrictions are those dictated by necessity—always to assure effective control by the leader and mutual coöperation between the various tactical units.

This mode of fighting does away with continuous firing lines which no longer fulfill the requirements of modern battle.

Belgium. The frontage of a battalion acting as part of a larger force in attack is fixed at 300 m.; in defense this is increased.

Japan. The provisions of the Japanese regulations are identical with those of the German regulations of 1889. The frontage of a company is not given. A battalion may cover a frontage not exceeding that of three companies. The frontage of a brigade, as a rule, does not exceed 1500 m. at the initial deployment.

Russia. The frontage of a company, unless otherwise specified, is governed by the object of the action, the terrain, and the effective strength, and, as a rule, does not exceed 250 paces (180 m.). No figures are given for the larger units.

England. While great stress was laid upon narrow fronts and thin firing lines prior to the Boer war, opinions swung to the opposite extreme after that war. During a decisive attack, a battalion in the first line may employ 125 rifles per 100 yards of front (*i. e.,* 90 m.), distributed as firing line, supports, and battalion reserve; the latter may consist either of one company or of parts of several. Entire companies are deployed only in exceptional cases, for instance in terrain devoid of cover where it is difficult to bring up reinforcements. The size of the reserve depends upon the losses likely to be suffered by the fighting line. When these losses will be small in all probability, the reserve may be as strong as the firing line and the supports combined. In accordance with these general principles, a battalion may deploy for attack on a front not exceeding 800 yds.=720 m. (Formerly 540 m. was prescribed). A brigade consisting of four battalions will thus be able to cover either a front of 1400 or one of 2100 m., depending upon the number of battalions put into the line.

Italy. Only general principles are prescribed. "Skill in judging the proper frontage to be covered by a force is attained in time of peace by exercises on varied ground and under different situations, especially when organizations approximately at war strength are used."

5. COMBAT ORDERS.*

Modern fire effect does not permit a commander to direct the course of an action by despatching adjutants from time to time. This must be borne in mind when issuing a combat order. Such an order can only regulate the launching of the troops into action and prescribe a task as a guide for their subsequent conduct. Since leaders change during the course of the combat, the order must ensure coöperation of the component parts of the force by thoroughly explaining the purpose of the fight. The troops have a right to know what the commander expects of them; it is not sufficient to order them to occupy a certain point—they must be told whether or not they are to defend it. An order which directs troops "to oppose" the enemy, conveys an extremely vague meaning; it should specify instead whether they are "to attack" the enemy, or whether they are "to defend" a position. The subordinate leader's pertinent question, as to the purpose of the combat, forces the commander to indicate clearly whether he intends to attack, or to stand on the defensive; whether he will fight a delaying action, or avoid a decision by withdrawing. Even the lowest grades must be informed of this decision of the commander. The troops will perform anything that is demanded of them in definite terms. On the other hand, the commander must demand that no subordinate "hide" behind an order and that, on the contrary, he act on his own initiative when an order is not received or the situation changes.

Clearly defined sections of the battlefield (par. 475 German I. D. R.) and definite combat tasks, each complete in itself (par. 293 German I. D. R.), are assigned to the tactical units to be employed in the first line (battalions in case of a regiment; regiments, as a rule, in case of a division). In attack, the order indicates the front upon which each one of the larger units is to deploy and what portion of the hostile posi-

*v. KIESLING, *Gefechtsbefehle*, Berlin, 1907.

tion it is to attack. This demarcation defines the extent of the combat sections (par. 371 German I. D. R.), within the limits of which the particular unit must make the most of the accidents of the ground. In carrying out these combat tasks, unity of action is ensured by the mutual coöperation of the tactical units fighting abreast of each other (par. 475 German I. D. R.), and by the designation of a unit upon which the others regulate their movements, without, however, thereby being hampered in their endeavor to advance. (Base unit of combat). Moreover, by employing his reserves, the commander "can shift the decisive point of the action to any place desired, reinforce where he deems it advisable, equalize fluctuations of the combat, and, finally, bring about the decision."

The first orders—those for putting the troops in motion in the desired direction—are usually verbal; more detailed orders, which are the rule from the brigade on up, are issued subsequently. (Par. 274 German I. D. R.). In most cases, the commander knows quite well what he wants, but only the effort required in expressing in writing what he desires to say, enables him to reproduce his thoughts with the necessary clearness. Even in peace maneuvers, the officer who issued an order and its recipients quite frequently disagree as to its interpretation; the superior remembers only what he desired to say at the particular moment, but not the language in which the order was couched. Written orders minimize the possibility of a misunderstanding. They have the further advantage that the recipient has in his possession a document to which he can always refer in case of doubt.

Orders should not provide for maintaining communication, for protecting flanks, and for keeping up local reconnaissance, since these matters are attended to as a matter of course, every leader being held responsible for making proper dispositions, within the limits of his command, for the performance of these duties. The higher the rank of the commander, the farther he should stay away from the scene of battle. As the commander can exercise an influence on the

course of the action only by employing his reserves, he should remain near them, or, at any rate, retain their leader on his staff. If the commander selects a position too close to the point where the first line is engaged, he loses sight of the action in its entirety, and allows himself to be influenced too much by events within his immediate range of vision.* The subordinate commander, in selecting his position, has to consider only good observation of the enemy, communication with neighboring units, with the next higher commander, and with his subordinates.

At headquarters, the work to be performed must be carefully apportioned among the different members of the staff.

The commander, assisted by an officer of his staff, observes the enemy and his own force, while another officer maintains communication with the neighboring force and with the next higher headquarters (signal flag squads, telephone), and receives and prepares reports. (The scheme described would be appropriate for a brigade staff, for example). It is furthermore desirable to despatch information officers to neighboring troops, and to detail officers from subordinate units to receive orders.

The detailing of adjutants from subordinate units for the purpose of facilitating the issue and despatch of orders of higher headquarters is very properly prohibited by par. 83 German F. S. R.; on the march, this is permissible temporarily only. The battalion supply officers will, however, frequently be utilized as information officers, for, on the day of battle, they would thus be most profitably employed.

In **France** this is regulated by *Agents de liaison.* These are to keep the commander informed in regard to the special situation, the action of subordinate units, and the intentions of their commanders. "The importance of permanent communication between leader and subordinate increases with the distances separating troops in action; the leader's influence on the course of the combat can be ensured only by these *agents.*

*This was true of Sir Redvers Buller at Colenso, and likewise of Kuropatkin. The latter led in person too much and was completely lost in the details of minor troop-leading.

As a general rule, one mounted officer from every infantry unit, from the battalion up, reports to the next higher commander for the purpose of maintaining communication. This officer may detail a cyclist or trooper to accompany him. He is to be prepared to give all necessary information in regard to his unit, and to keep in touch with the general situation in order to inform his immediate superior in regard to it. He communicates with his own unit either by sending orderlies with messages, or by carrying the orders of the commander in person."

6. COMMUNICATION ON THE BATTLEFIELD.

Cyclists and mounted messengers can be employed on the battlefield only when the conditions are exceptionally favorable; even intrenched connecting posts communicating with one another by means of shouts or signals do not absolutely ensure communication in a protracted engagement. Heliographs or signal lamps are valuable only during the approach to the battlefield and in large battles.* The same is true of the field telegraph, by means of which, for example, division headquarters may be connected with the headquarters of the corps. In an infantry combat, only the field telephone, semaphore flags,† and signal flags can be used. The employment of telephone and telegraph has the advantage of ensuring greater quiet at headquarters, since the coming and going of messengers is eliminated; on the other hand, the commander is at once informed of every reserve (which may perhaps be only temporary) and will not always be able to resist the temptation of leading subordinate commanders by apron strings. The Japanese made a very extensive use of the various means of communication, but neglected to guard against an interruption of their lines of information by installing signal flag stations. This cannot be dispensed with. In the Japanese army visual signals‡ were not used, and in the the Russian,

*See *Taktik*, III, p. 116, et seq.

VON LÖBELL'S *Jahresberichte* 1906, p. 390: *Employment of Heliographs and Signal Lamps in* Southwest Africa.

†Semaphore signals have been abolished and Morse signals prescribed in their stead by Cabinet Orders dated January 16th, 1908.

‡Sir IAN HAMILTON, *A Staff Officer's Scrap Book*, I, pp. 173-174, 196, 241 and 323.

army they were not adopted until October 4th, 1904. Thus means of communication did not develop beyond the rudimentary stage in both armies. According to all previous experience, telephone lines, as now operated, are practicable in attack only for the purpose of establishing communication down to brigade headquarters.*

Until recently, both signal and semaphore flags were used in Germany.† The signal motions are made in an upright position, the Morse code, which is rather difficult to learn, being used. This method of signaling permits communication to be kept up within a radius of 7 km.; moreover, it can be used at night and in combined land and naval operations. The semaphore signals are easily learned and entirely sufficient for communicating over distances within 3 km.; they also permit information to be despatched rapidly, if abbreviations are employed for certain frequently recurring movements. These signals possess the additional advantage that they can be made by a man while in a prone position.‡ Semaphore signals are a very effective means of communication and will rarely fail.¶

*The station apparatus furnished by the firm of "Zwietusch" of Charlottenburg, weighs 5.5 kg. with its battery.

In defensive positions, which are held for a prolonged period, it is, of course, practicable to establish telephonic connection with the most advanced line. This was, for example, the case in the Japanese 10th Division on the morning of March 3rd, 1905 (Mukden). On this occasion the division commander in rear was informed by telephone of the presence of wire entanglements in front of the Russian position, and permission was asked and granted to postpone the attack.

†*Jahrbücher für Armee und Marine,* June number, 1906, and March number, 1907.

‡Signals with semaphore flags can be made by a man lying flat on his belly or on his back; this is, however, frequently impossible with outstretched arms and the sender must be content to make the signals by grasping the staves of the two flags in the middle, then placing them in appropriate position relative to each other (for example in making the letters, d, e, k, l, p, u).

¶The signals prescribed in par. 11 German I. D. R. are very effective if made with semaphore flags; if made with signal flags they require constant observation, without, however, precluding mistakes. For example, when given with signal flags, the signal "halt" = "h, h, h," (.... ....) is frequently confused with the signal "the assault is about to begin" (... ... ...). This mistake is not so apt to occur when semaphore flags are used.

When General Stakelberg, after his right flank had been turned at Wafangu, sent orders to withdraw to General Gerngross, the commander on the left flank, it took the officer who carried the order through this mountainous country, nearly an hour to cover the 5 km. which separated the two commanders. An order sent by means of semaphore flags could have reached the leader in question within a few minutes.

A commander should not exercise a constant influence on his subordinates just because modern means of communication permit him to do so, as this would destroy all initiative and independence. The permanent communication to which we are accustomed in time of peace, and the method of leading produced thereby, do not allow real qualities of leadership and initiative to develop. It is unquestionably not easy for a commander to refrain from interfering when a deployment does not progress with sufficient rapidity or not in accordance with his wishes.*

Austria-Hungary. "Infantry telegraph detachments" are assigned to every infantry division and brigade of mountain troops.† These detachments are charged with the duty of keeping up the visual signal and telegraph service in field and mountain warfare. The Morse alphabet is used in visual signaling and in telegraphic communication. In this the Austrian regulations differ from the German. The infantry telegraph detachment attached to an infantry division is divided into three sections, and is equipped with telephones, wire, heliographs, and signal flags. Each section consists of 15 men (6 of whom are telegraphers), and is equipped with 24 km. of wire.

France. Provisional signal detachments have been formed in some of the infantry organizations. These detachments are to take care of visual signal and telephone communication. The telephone sections are expected to maintain two stations (12 km. wire).

England. Each brigade (4 battalions) has one telephone detachment. Wire (9.6 km.) is carried along on two pack animals.

7. LOCAL RECONNAISSANCE OF THE INFANTRY.

(Pars. 305, 319, 355, 363 and 376 German I. D. R.).

It is a strange fact that, while splendid work was done in strategic reconnaissance in the large maneuvers of recent years, not only in Germany but also in France, the local, tactical reconnaissance was not so good and often deficient, so that in

*Interference of the Commander-in-Chief of the IIIrd Army with the deployment of the Ist Bavarian Army Corps at Wörth. KUNZ, *Kriegsgeschichtliche Beispiele*, 15, p. 44, et seq. The impatience of the commander-in-chief was natural perhaps, but, due to his interference, the enveloping movement skillfully initiated by General v. d. Tann, could not be executed.

†*Streffleur*, 1905, April-May number.

consequence thereof surprises were not rare. Frequently a gap occurred in the reconnoitering line when the cavalry in front of the various parts of the army was brushed aside and the stronger cavalry force deprived the weaker of the freedom of choosing its line of retreat. Occasionally, when this happened, cavalry patrols were sent out with orders to report directly to the infantry, or, at any rate, to find the hostile route columns, but this expedient was only partially successful. It must be remembered that troopers cannot ride close enough to the enemy to see anything of importance, and that they frequently are in ignorance of the very things which are of value for the infantry. In addition, the divisional cavalry is entirely too weak to perform all the tasks assigned to it. Therefore infantry and artillery should not rely upon cavalry reconnaissance. The mere fact that infantry has sent out cavalry patrols in a certain direction does not relieve it from the duty of providing for its own reconnaissance.

The greatest obstacle to infantry reconnaissance lies in the fact that its cyclists are confined to good roads; that its mounted officers cannot be withdrawn from their appropriate duties except for short periods; that, as a rule, orderlies are not available for carrying messages; and that, if officers carry messages in person, the reconnaissance is interrupted. Infantry patrols, on account of the slowness of their movements, cannot transmit messages quickly, and, as a result, such messages frequently arrive too late to be of any value. On the other hand, infantry patrols possess an advantage in that, by utilizing cover, they can get close to the enemy without being observed. The need of local reconnaissance is greater now than it was in the past, because troops can no longer change front when deployed, and because those which come under hostile fire while in close order formations may, in a short time, suffer well-nigh annihilating losses.

In the South African war the British infantry was frequently placed in difficult situations by the suddenly delivered fire of the Boers (**Magersfontain, Colenso**), which induced it to deploy all of its lines on a wide front at an early moment.

The Japanese attached much importance to local reconnaissance, whereas the Russian leaders considered it as something unusual, so that Kuropatkin was finally obliged to prescribe it in army orders. "Local reconnaissance was performed by 20 to 30 infantrymen. These carefully approached our positions in small groups. One man of each group laid his rifle aside and crawled close up to our trenches, raised his head and observed, while three or four of his companions, whom he had left farther in rear, opened fire on the trenches. Occasionally all of these men threw themslves flat on the ground for protection. This mode of procedure continued for seven hours."

The thoroughness of the reconnaissance generally made a timely deployment possible, even when the enemy was well concealed, but that neglects occurred nevertheless is borne out by the advance of the Japanese 2nd Division at **Fuchau** and **Kapukai** on March 10th, 1905. This division advanced without reconnoitering, struck the fortified Russian position, was unable to move forward or to the rear, and had to fight under unfavorable conditions, and while suffering heavy losses, from early morning until 4 P. M., when the general situation compelled the enemy to evacuate the position. The advance of the Russian 54th Division (Orlof) during the battle of **Liao Yang** (2nd Sept.) is a similar example of disproportionately greater importance and with a tragic ending. The noise of the battle at **Sykwantun** caused the commander of the 54th Division to leave the position assigned him on the heights of the **Yentai** mines and to march toward the sound of the cannonading. The division, advancing over covered terrain without adequate reconnaissance, was taken in flank and rear by the Japanese 12th Brigade (Sasaki),* and thrown back in utter rout upon its former position, carrying with it the troops which had been left there. Thus the Yentai heights fell into the possession of the Japanese.

The primary object of local reconnaissance is to protect a force from surprise. This may be accomplished by sending out combat patrols, and by company commanders riding ahead in time. (Par. 457 German I. D. R.). The latter are likewise charged with picking out avenues of approach to selected fire positions, and the sooner they begin the reconnaissance the better, for the accidents of the ground can then be utilized to the best advantage.

The difficulties of the reconnaissance are increased when

*For details of the attack made by Sasaki's Brigade, see GERTSCH, *Vom russisch-japanischen Kriege*, I, sketch 14.

we have to reckon with the measures taken by the enemy to screen his force.*

Weak infantry patrols can neither break down this resistance nor create the necessary opening through which the leaders can reconnoiter in person. Stronger forces are requisite, and "reconnaissance companies" may have to be sent out toward the enemy to serve as a support for the patrols, to reinforce them when necessary, and to constitute natural collecting stations for messages. "Reconnaissances in force" are the result of these endeavors to obtain information,† for the defender will not reveal his dispositions unless the attacker threatens an attack. Reconnaissances in force are especially appropriate in this case, since the information obtained in regard to the position and strength of the enemy can be utilized at once. (Par. 134 German F. S. R.).

In France great importance is attached to forcibly gaining information by means of detachments of all arms which also prevent hostile reconnaissance. In minor operations the French send out infantry detachments, which, from secure hiding places, pick off observers, screen the position of their own force, and prevent the enemy from using covered avenues of approach. However, these very patrol combats may cause the commander to come to a false conclusion in regard to the hostile position. If the cavalry reconnaissance has determined that the enemy intends to accept battle within a particular area, the details of his intentions must be obtained by local reconnaissance. Then the commander will wish to know whether or not an immediate attack is feasible, or whether it is advisable to wait until nightfall for bringing up the infantry. The local reconnaissance determines where the flanks of the enemy are located; whether the position in front is the hostile main position or only an advanced post; whether the enemy

*"The attacker's reconnaissance must be prevented as long as possible. Frequently patrols in the foreground will suffice for this purpose. (Par. 406 German I. D. R.)

†See *Taktik*, IV. p. 214, et seq. The results of the reconnaissance in force made at Neuville aux Bois were very unsatisfactory.

has made preparations for defense; and where the hostile artillery is posted. As a rule, it will be impossible, until after the engagement has begun, to recognize a skillfully located fortified position,* to distinguish between the real and dummy trenches, determine the position of obstacles and estimate whether they can be surmounted with or without adequate apparatus. Then it likewise becomes necessary to find and mark covered avenues of approach.† In moving to new firing positions, it is important that advanced positions, masks, and dummy trenches be recognized in time. The commander of a unit on a flank should make dispositions for observation on his flank, and for permanent communication with neighboring units, even though no specific orders have been received by him to that effect. Strange as it may seem, the troops deployed on the road Gorze—Rezonville (battle of Vionville), by their failure to get into early communication with the troops which had been on the ground for some time, neglected to take advantage of the information gained by those troops.‡

The enumeration of these tasks shows that local reconnaissance should not be restricted to the preparatory stage of the combat alone, but that it must be kept up during the whole course of the action. To the duties enumerated, we may add, occasional tasks, such as picking off staffs and signal men; sneaking up on artillery that has been incautiously pushed forward; and annoying the enemy by flanking fire. For such tasks, so-called "scouting detachments,"¶ after the Russian pat-

*See *Taktik*, V, p. 243, et seq.

†HOPPENSTEDT (*Schlacht der Zukunft*, pp. 134 and 140) draws a graphic picture which is a faithful reproduction of reality.

The procedure outlined by that author (Ibid., p. 122) for indicating, by means of flag signals, points sheltered from hostile fire, seems practicable. He states: "Holding his flag upright, the member of the patrol proceeds steadily on his way to Weyer. Now he has arrived at the point where the road bends slightly toward the south; his flag descends," etc.

‡KUNZ, *Kriegsgeschichtliche Beispiele*, 8-9, p. 128, et seq., p. 243.

The necessity for thorough reconnaissance is illustrated by the successful "fire surprises" carried out by the Boers at Modder River on November 28th, 1899, and at Colenso, against Hart's Brigade advancing in dense masses, on December 15th, 1899.

¶V. TETTAU, *Die Jagdkommandos der russischen Armee*, Berlin, 1901. HOPPENSTEDT, *Patrouillen und Radfahrkommandos*, 1907.

tern, have frequently been recommended. Their usefulness in difficult country and in operations against the enemy's flank and rear cannot be denied. In minor operations, if provided with ample ammunition and advancing on side roads, they can hamper the reconnaissance of the enemy, secure the flanks of their own force, ascertain the probable extent of the prospective battlefield, and finally, having made a skillful lodgment, they can become very annoying to the hostile artillery. In a large battle the necessary elbow room for such employment is lacking. To form picked men into special organizations, as is done in Russia, is always of doubtful value. The constant transfer of their best men to the mounted infantry during the second part of the South African war was fatal to the British infantry battalions. An organization cannot dispense with its good men; it needs them to replace wounded non-commissioned officers. While everything goes without a hitch, the withdrawal of good men from an organization is of little importance; the drawbacks to this procedure become apparent, however, when the line begins to waver, when, in the absence of officers, only the example of the courageous men prevents the weak-kneed from running away. Our regulations properly appreciate the importance of psychological impressions during critical combat situations; they state: "The man who feels his courage and coolness going, in the excitement of battle, should look toward his officers. Should they have fallen, he will find plenty of non-commissioned officers and brave privates, whose example will revive his courage." (Par. 268 German I. D. R.).

If it becomes necessary to despatch a stronger infantry force on a mission of minor importance, it will usually be better to detail an entire company than to improvise a detachment whose leader would know his men only imperfectly.

Before the 95th Infantry (French) made its attack on the brewery of **l'Amitié** (south of **Noisseville**), on August 31st, 1870, a reconnoitering

detachment had ascertained the strength of the position and the manner in which it was held by the defender.*

Examples of the successful employment of flanking fire by small forces:

The flanking fire, delivered from the **Bois des Ognons** by about 30 men of the 12th Company, 72nd Infantry, compelled the French to withdraw their left flank. (Combat on the Gorze—Rezonville road, 16th August, 1870).†

At **Gravelotte-St. Privat,** flanking fire is said to have caused the withdrawal of nine French battalions which had until then delivered an effective fire upon the Prussian Guard Artillery.‡

8. THE IMPORTANCE OF THE TERRAIN.

The defense requires extensive, open terrain, permitting unobstructed view, while the attack requires stretches of ground hidden from the observation of the enemy and sheltered from his fire, in order that the troops may be deployed for action at the decisive ranges. A piece of ground will rarely possess all these advantages, but, nevertheless, well-trained infantry will be able to defend sucessfully a piece of ground that has a poor field of fire, and infantry which is energetically and skillfully led will be able to cross even an open plain.

At the longer ranges, a force will, in the first place, endeavor to keep concealed. While advancing, troops will rarely be able to take advantage of available cover, but at a halt and while firing they will be able to do so. Their taking advantage of the ground should not lead to a diminution of the energy of the advance, and should not cause parts of the force to fall behind.¶ "The terrain exerts considerable influence on the formation of troops. Open country requires that distances be increased so that the losses may be minimized, while close coun-

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**Wald und Ortsgefecht,* p. 192.

†KUNZ, *Kriegsgeschichtliche Beispiele,* 8-9, p. 146.

‡*Ibid.,* 10, p. 24, and 12, p. 24, et seq.

¶This is equally true of ground that is difficult to march over; the troops must cross it. The evasion of difficult portions of terrain usually leads to disorder and a dispersion of the troops. For the advance of the 18th Infantry Brigade at Wörth, see KUNZ, *Kriegsgeschichtliche Beispiele,* 14, p. 101. (Thick underbrush in the woods on the Fuchshübel.)

try permits distances to be reduced. The commander should take particular care not to let this advantage escape him, since it is often necessary in this case to reinforce the first line promptly. Close order formations may be retained longest on covered terrain." (Par. 307 German I. D. R.).

An attack over a plain devoid of cover "should be avoided as far as possible, or weak, widely extended detachments only should be ordered to advance over it, while the bulk of the force is launched at a point where an approach under cover is practicable. If suitable terrain is lacking to permit this, then the decisive attack must be led over the open plain." (Par. 325 German I. D. R.). In contrast with the continuous skirmish lines of the past, which are still favored by the Austrians, the German regulations permit a gap to be left in the line where an open plain devoid of cover exists, without thereby implying that it cannot be crossed. The French regulations (par. 257), contrary to the German, contemplate that "only weak detachments be left in the open, fire swept spaces," and that the troops intended for the fire fight be pushed forward under available cover, separate groups being thus formed.*

"This mode of fighting in groups does away with the continuous firing lines of the past which no longer fulfill the requirements of modern battle.

"The rearmost fractions of the force endeavor to avoid open spaces, or such as are swept by hostile fire, by moving, sometimes in a close order formation and again widely extended, toward the lines of cover, without regard to the direction in which the enemy may happen to be. The unit that finds the advance easiest takes the lead, and all the others, supported by the fire of their immediate neighbors, endeavor to follow it.

"Depending upon the character of the terrain and available cover, the forces deployed for the fire fight will, there-

*This should be an important hint for the opponent. The lines of approach may perhaps be sheltered with reference to a certain point, but there will always be portions of the enemy's line from which a fire may be directed upon these avenues of approach and the troops marching thereon.

fore, advance in a rather dense formation in the areas favorable for such a procedure, while weak forces only will be found on open and fire swept ground. The advance is regulated by designating the objective of the attack and by stipulating the necessity of mutual coöperation."

This French group attack owes its existence to the silently accepted fact that an open plain cannot be crossed when swept by unsubdued hostile fire; it reckons with an unfavorable terrain such as an attacker will only find in exceptional cases. We by no means fail to recognize the fact that individual portions of the attacker's force, when favored by the terrain, will be able to advance more quickly than others, and that other portions may even be compelled to discontinue their advance for a time; but it seems a precarious proceeding to lay down this result of the hosile fire effect as a guide in the training of troops. The group tactics of the Boers stood the test only on the defensive; they could not prevent individual groups from being attacked by far superior forces. In an attack, the units favored by the terrain will constitute the framework upon which the units which are compelled to advance more slowly, will form. There is, however, danger that these leading groups will succumb to the superior fire of a defender who is deployed on a broader front. Although this may not happen, the spirit of the regulations tempts leaders to drive everything forward, to rush ahead with isolated parts of the force. An additional drawback of these systematic group tactics lies in the difficulty of deploying the troops moving in the narrow avenue of approach. If the French infantry really desires to avoid the plain and wants to stick principally to cover, who will guarantee that the great freedom allowed it, will not cause it to crowd together under cover, lose the direction to its objective, and become completely mixed up?* This danger is the

*The plentiful cover along the ravine of the Mance brook was by no means an actual advantage for the Ist Army. The 18th of August presents the strange phenomenon of the success of the attack on St. Privat, made over terrain devoid of cover, and the failure of the attack on the French IInd Corps, made over the most favorable terrain imaginable.

more imminent since no importance is attached to a more definite limitation of the frontage to be covered, while wide extension is, on the contrary, actually preached. The fear of losses will gain the upper hand and the attack will lose its energy. "It is easy to teach troops to be over-cautious, but it is a precarious undertaking to lead such troops against the enemy." (Sir IAN HAMILTON).

Whither such an endeavor to utilize cover must lead, is shown by the advance of the 35th Füsilier Regiment past **Vionville** on **Flavigny** and the group of trees north of that village. The violent fire directed upon these companies caused them to deviate to right and left, to leave their battalions, and to lose the march direction designated by the regimental commander.* One company of the IInd Battalion 35th Füsilier Regiment, which formed the center (march direction, a point north of Flavigny), participated in the assault made on Flavigny by the IIIrd Battalion; the other companies moved to the left against Vionville and were joined by a company of the IIIrd Battalion.—"A peculiar feature of this fight was the fire directed from the group of trees on the attacking force which advanced against the center of the hostile position. Ten of the twelve companies of the attacking force (3rd, 4th, 5th, 6th, 7th, 8th and 11th of the 35th Füsilier Regiment, and 9th, 10th and 12th of the 20th Infantry) were scattered to right and left by this fire, and forced to move in a totally different direction than was originally intended. The direction was maintained to a certain extent only by two companies (the 3rd and 11th of the 20th Infantry)."†

While the new German Infantry Drill Regulations do not underestimate the difficulties of an advance over open ground, they require that the march direction be maintained and that cover to be utilized only within the assigned "combat section"; they leave it to subordinate commanders to choose suitable expedients for crossing such unfavorable ground. "Within the limits of the section assigned to an organization for an attack, the plain devoid of cover should be avoided as far as possible, or weak, widely extended detachments only should be ordered to advance over it, while the bulk of the force is launched at a point where an approach under cover is practicable. *If suitable*

*Gen. St. W., I, p. 560.

†v. SCHERFF, *Kriegslehren*, II, p. 106. With a sketch (A) showing lines of advance of the companies.

terrain is lacking to permit this, then the decisive attack must be led over the open plain." (Par. 325 German I. D. R.). For purposes of instruction, it is entirely correct to require "that even on terrain devoid of cover, well-trained infantry should not open fire until the medium ranges are reached." (Par. 326 German I. D. R.). The necessity, when under hostile fire, of adapting movements to the accidents of the ground, should not impair the energy of the advance and cause portions of the attacking force to lag behind, thereby disintegrating it. On the other hand, we should not be afraid to leave gaps in our attacking line, as the enemy would, in any case, not be able to use them for his own advance.

Thus we have here the German united attack, on the one hand, and the French group attack, on the other. Since group tactics no doubt diminish losses, they should be used in delaying actions, in holding attacks, and in defense; they should unquestionably not be employed when a concerted, rapid movement of skirmishers to the front becomes necessary. How should the Vth Corps at Wörth and the Guard at St. Privat, for instance, have attacked, according to the French regulations?

VI. MACHINE GUNS.*

1. DEVELOPMENT OF THE ARM.

The effect of canister had decreased considerably with the introduction of rifled guns, and this was the more noticeable, because, simultaneously therewith, the accuracy and rate of fire of the infantry rifle was greatly increased. The attempts to re-invest the artillery with its one-time superiority were directed in two channels: one aimed at perfecting shrapnel, which had been rather neglected up to this time (England, Prussia, Austria), while the other resurrected the mediaeval idea of the "barrel-organ gun," with a view of assembling a number of rifle barrels and of combining thereby the accuracy of the small arm with the moral effect of canister. Thus, among others, the 4—10 barreled *Gatling* gun was invented in America in 1861, it being the oldest representative of this type of weapon. In order to obtain a weapon matching the Prussian *needle* gun, Bavaria adopted the 4 barreled *Feldl* gun and France the 25 barreled *mitrailleuse.*† The name *canon à balles,* which was given the gun, sufficed to indicate the manner in which it was intended to be used. As these guns frequently failed in action, offered the same target and required the same equipment and approximately the same road space as field

**Exerzierreglement und Schieszvorschrift für die Maschinengewehrabteilungen,* 1904.

Captain BRAUN, *Das Maxim-Maschinengewehr und seine Verwendung,* Berlin, 1905.

†The 25 barreled *mitrailleuse,* cal. 13 mm., fired volleys at the rate of 125 rounds per minute. Its fire was considered equivalent to that of 50 needle guns; its weight was 1,485 kg., each of its four horses pulling 371 kg.; its maximum range was 3,000 m. its most favorable, practical range 500—1,500 m.—A glaring defect of the gun was that fire pauses occurred whenever cartridges were fed into the slot and that the lateral spread of its cone of dispersion was extremely small.

guns, the states who had first adopted them, finally decided to dispense with them on European theaters of war. The further development of machine guns was not especially accelerated by the fact that the French *mitrailleuses* had not fulfilled the expectations entertained for them during the Franco-German war, isolated cases excepted,* and that they were quickly silenced by the German artillery, which was equipped only with percussion shell, as soon as their position was ascertained. Thus, these guns seemed useful only in colonial wars and on board war ships for warding off torpedo boats. Although they took up very little room when in position, they were not considered useful for flank defense in fortresses, on account of the frequent breakdowns. In addition to their height, other defects developed; for example, they could obtain only a very insignificant rate of fire, betrayed their position by the powder smoke, and lacked the means for ascertaining ranges.

The situation changed entirely when a practicable, smokeless powder was invented, and Hiram Maxim, an American, succeeded in utilizing the energy of the recoil (a factor neglected up to that time, although annoying to the marksman) for opening the breech, inserting a fresh cartridge into the chamber, closing the breech, and automatically firing the piece.† Through this invention it became possible to fire a maximum of 900 and an average of 500 rounds per minute, from a single barrel moving laterally back and forth. The desire to obtain a still greater rate of fire was checked effectively, because of the fact that with such an increase the danger of jamming increased and the use of infantry ammunition was precluded. The water in the jacket continues to be a decided drawback to this type of gun, for it is not always easily procured, impairs the mechanism by freezing, makes it difficult to

*Battle of Gravelotte. *Gen. St. W.*, pp. 705—712, 723 and 781. The employment of three Gatling guns in rear of the park wall of Yoré, during the defense of the plateau of Auvours. (*Revue d'artillerie*, 1900, p. 297; *Gen. St. W.*, IV, p. 817).

†Of the other types the following may here be mentioned: *Hotchkiss* (France), insufficient cooling of the barrel by air; *Schwarzlose* (Austria), machine gun model 7, a very simple weapon which has only a single spring.

change barrels, and constitutes a considerable weight. If cooling the barrel by means of water were to be dispensed with, the accuracy of the piece would rapidly diminish, and, after 1000 rounds of continuous fire, bullets would tumble even at short ranges. At the present time water is still the most effective means of cooling the barrel.*

Machine guns fire ordinary small arms ammunition carried in loops on a canvass belt (weighing 1 kg. when empty), which is generally capable of holding 250 rounds of 8 mm. cartridges weighing 8.315 kg. These belts are very carefully manufactured, the material being shrunk, so as to prevent their shrinking when in use. Two men can refill an empty belt with 8 mm. cartridges in seven minutes, according to Swedish experiments, while a belt filling machine can refill one in a still shorter time. The rate of fire of machine guns is approximately 500 rounds per minute. They are variously mounted,† according to circumstances, on sleds (in which the gun rests on a frame similar to that of a wheelbarrow), on tripods, or, for mountain warfare, on basket frames. Although the greatest readiness for firing was obtained with guns mounted on cavalry carriages (two-wheeled carts, similar to limbers, and equipped with shafts), which also permitted the greatest amount of ammunition to be carried along, these guns offered such a high target that their use, in an infantry action, was entirely out of the question, leading only to their being quickly silenced. Another defect was that the guns were unable to follow immediately upon the heels of the organization to which they were attached. Guns mounted on light tripods possess the least readiness for firing, as the gun must be dismounted during each change of position; but tripods are in-

*In the *Colt* Machine Gun, which is not water-cooled, after 500 rounds had been fired, a cartridge inserted into the piece exploded in seven seconds, and cartridges placed in the chamber a quarter of an hour later exploded in 20 seconds.

†British cavalry machine gun with mount.....152.3 kg.
Machine gun with tripod.....
Machine gun with basket frame } latest model..... 35.0 "
Machine gun with sled.....
.....16.5+18= 34.5 "
.....16.5+24= 40.5 "

dispensable in mountain warfare. In India a tripod frame on wheels is employed. The basket frame, which is very light and is carried on the back of a soldier, affords nothing but a rest for the gun. This type of mount has the disadvantage of necessitating, in reality, freehand firing when the barrel is supported near the muzzle; that the operator, when firing continuously, becomes greatly fatigued, and that the accuracy suffers in consequence thereof. The advantages of the tripod and the wheeled carriage have been skillfully combined in the carriage adopted in Germany. In this the gun rests on a sled; this is in turn supported by the carriage proper, which is wheeled. In exceptional cases the gun may be fired from the carriage, but ordinarily it is fired from the sled, which is detached from the carriage for that purpose. This sled permits the gun to be laid at any desired height and enables it to follow the infantry anywhere during an action.*

Machine guns can be transported upon larger vehicles capable of being unlimbered; they can also be carried on pack horses or other pack animals, and for short distances by men. Although pack animal transportation enables the guns to follow the troops anywhere, the amount of ammunition that can be carried along is limited, and the opening of fire is retarded, since gun and tripod must first be assembled; the opening of fire may even be delayed when a pack animal falls; ammunition cannot be carried on the gun; and the animals get sore backs even if pack saddles are carefully adjusted.

2. THE POWER OF MACHINE GUNS.

The machine gun is noted for its adaptability to any terrain, and the constancy of its high rate of fire as compared with that of a body of infantry, which decreases with the

*The following complement per gun is considered necessary:

Germany.....14½ men..... 9 horses.
Switzerland..... 8½ men.....12 horses.

In the Russo-Japanese war the machine gun detachments of the Russian cavalry were equipped with *Rexer* guns which can scarcely be considered machine guns owing to their slow rate of fire and extreme heating of the barrel.

range, the diminishing visibility of the target, and prolonged fire. On the other hand, a single jamming can make a machine gun valueless, at least for the time being. For this reason, the Germans employ machine guns only in platoons, as a rule, and the Swiss let both guns of a platoon fire simultaneously only in exceptional cases. Theoretically, the maximum rate of fire of 600 rounds per minute will rarely be attained; and 200—300 rounds per minute will usually suffice against prone targets. In Germany volley and continuous fire are employed; fire by a single piece is used only to ward off patrols when the machine guns do not want to betray their position.*

A volley consists of about 25 rounds and is followed by a pause for observing the effect of the fire. It is employed in adjusting the fire upon difficult targets in rolling country. Fire for effect consists, as a general rule, of "continuous fire," and is interrupted only when the tactical situation requires it. The water in the jacket should be renewed and oiling attended to during the pauses in the fire, whether these grow out of the tactical situation, or are made necessary by technical considerations.

The fire is either directed upon a point (concentrated fire), the elevation and direction of the piece being fixed, or it is distributed over the entire target or over a designated part of the same (sweeping, and progressive fire).†

*The following kinds of fire are used in the countries named below:

Austria: Single shots; volleys (20—25 rounds); fire at will.

Switzerland: Fire by a single piece; volleys (20—30 rounds); rapid fire (volleys of 100 rounds); and fire at will (both pieces of a platoon simultaneously employing rapid fire). The last-named is only employed in exceptional cases, for example, when the danger is imminent and when favorable opportunities offer.

†For example, when sweeping the crest of the parapet of a line of trenches, or the edge of a wood, both hands move the gun slowly and evenly from side to side. When searching an area in the direction of depth and obliquely (progressive fire with sweeping), the left hand gives the gun the proper horizontal direction, while the right manipulates the slow motion elevating gear. When firing on rapidly moving targets—for example skirmish lines advancing by rushes—or targets advancing over rolling country, both the traversing and elevating movements may be unclamped. The rapidity with which the gun is moved, when sweeping or searching, depends upon the range and the kind of target on which the fire is directed. As a rule, the piece is moved slowly and steadily. The accuracy of the fire is impaired when the gun is moved too rapidly.

The ballistic properties of the gun are the same as those of the infantry rifle.*

In the machine gun an important factor in the dispersion of infantry fire—flinching and errors in aiming—is eliminated, while the heating of its barrel and the vibrations of its carriage in continuous fire do not produce a corresponding increase in dispersion. On this account the cone of dispersion of the machine gun is more compact than that of the infantry rifle and its accuracy at long ranges is therefore considerably greater than that of the latter.† Firing tests indicate that the accuracy of machine gun fire diminishes only very slightly with increasing range, provided the appropriate elevation is used.‡

In war the influence of the compact cone of dispersion will be still more potent, for we will then have to reckon with a single, specially selected machine gun marksman who is well protected, while the excitement of battle will produce a far different impression upon an organization composed of men differing materially from each other. The compactness

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When the fire is well observed, it might be advantageous, in exceptional cases, when firing against either stationary or moving targets, to direct the gun, without aiming, after the bullets have been seen to hit their mark, by properly manipulating the elevating and traversing apparatus while the firing is in progress.

*The destructive power of the projectiles fired from a machine gun, as they strike within a small space, is, of course, much greater than that of the scattered projectiles of a body of infantry. Trees having a circumference of 30 cm. are felled by machine gun fire in about 15 seconds at a range of 450 m.

†According to Austrian experiments the depth of the beaten zone of a machine gun is only ⅛ to ½ that produced by the fire of a platoon of infantry.

‡The following average results were obtained in experiments made at the Musketry School, while firing on infantry targets advancing alternately at quick and double time:

At ranges from 2000—1600 m. . . . . 1.72% hits
" " " 1500—1200 m. . . . . 2.53% "

Firing against disappearing head targets placed at intervals of 0.60—0.70 m.:

At 600— 800 m. . . . . 1.89% hits
" 800—1100 m. . . . . 1.69% "

In firing first with an elevation of 1800, then with one of 1750 m. (the range being 2000—1600 m. and 254 rounds being expended per gun), on 50 advancing, kneeling targets, placed at intervals of 1 m. 3.10% hits were obtained and 52% figures were placed out of action in 1½ minutes.

In firing at the same targets for 2½ minutes, with an elevation of 1900 m. (304 rounds expended), the result dropped to 0.3% hits and 8.3% figures placed out of action.

of the cone of dispersion of the machine gun requires that the appropriate elevation be used if the fire is to be effective against well concealed prone skirmishers. This can be accomplished only in part by employing range finders. Since the probable error of these instruments is ±5% of the range, this determination is so inaccurate for machine gun fire that nothing remains but to increase the dispersion artificially. When it is impossible to observe the strike of the bullets, the dispersion may be artificially increased by employing combined sights, two in a single platoon and three in a machine gun battery (company), and above all by sweeping. The employment of combined sights would appear to be too rigid a method; sweeping fire is at any rate better.*

From general ballistic data, Lieutenant-General ROHNE† computes that the following results would be obtained by a machine gun and a detachment of skirmishers when firing with the appropriate elevation at a broad target 1 m. high:—

	Machine gun	Detachment of skirmishers
At	500 m.....32.4	16.8% hits
"	1000 " 15.3	8.1% "
"	1500 " 10.2	5.1% "
"	2000 " 6.4	3.2% "

This nearly double superiority is reversed, however, when the appropriate elevation is not used:

Range. m.	Firing on a target 1 m. high, the following percentages of hits may be expected when the error in estimating the range is—							
	50 m.		100 m.		150 m.		200 m.	
	Machine guns.	Skirmishers.	Machine guns.	Skirmishers.	Machine guns.	Skirmishers.	Machine guns.	Skirmishers.
500	27.5	16.0	19.0	13.8	7.0	11.7	1.3	7.3
1000	9.2	6.8	2.0	4.8	0.2	2.7	——	1.0
1500	3.6	3.9	0.2	1.8	——	0.5	——	0.1
2000	1.7	2.2	——	0.8	——	0.2	——	——

*Lieutenant-General ROHNE, *Schiesslehre*, 2nd Ed. p. 185, et seq.
†*Jahrbücher für Armee und Marine*, 1901, IV, p. 268.

From this it follows that the good qualities of the machine gun can be utilized to the fullest advantage only when the appropriate elevation is used. When this is not accurately known, the fire effect of the machine gun drops down to zero more quickly than that of a skirmish line. Where local conditions are at all favorable, the determination of the appropriate elevation is facilitated by observing the strike of the projectiles in "volley fire."

According to British firing tests, at ranges from 500—1000 yards an error of estimation of 100 yards, reduces the effect of the fire 50 per cent. According to firing tests 75% of all shots fired by a machine gun and body of infantry are distributed as follows:

At	Machine gun. Depth of 75% strip	Detachment of infantry. Depth of 75% strip	Errors of estimation permissible for the machine gun.
m.	m.	m.	m.
450	112	192	54=12 %
900	63	108	31= 3.5%
1350	54	90	27= 2 %
1800	67	140	31= 1.8%

It is clearly apparent that the permissible error of the range finder is smaller than the depth of the vertical dispersion strip covered by 75% of the bullets.

The difficulty of hitting a target lodged in some feature of the terrain requires that the machine gun be used first of all against large targets that are visible for a short time only. When the appropriate elevation is used, a decisive effect may be confidently counted on within a short space of time; when an inappropriate elevation is used and the fire is not properly observed, only accidental hits can, as a rule, be expected, even when the fire is directed on tall, dense tragets. When the fire is directed on skirmishers lying down, the effect produced is not commensurate with the amount of ammunition expended, and a slight error in the elevation used may nullify the effect

entirely. A straight line of trenches, which is plainly visible, is, on the other hand, an eminently favorable target. The heating of the barrel, and the difficulty of replenishing ammunition and renewing the water in the jacket, tend to work against a participation of machine guns in a protracted fire fight. The machine gun is not at all suited for carrying on a prolonged fire action.

It is very difficult to determine the relative combat value of a body of infantry as compared with that of a machine gun. One will not be far wrong in placing this value between 50 and 60 men.

In experimental field firing at the Swiss Infantry Musketry School, it was demonstrated that 30—40 skirmishers almost in every case rapidly gained the upper hand over a machine gun in the open, at 900 m., but that the infantrymen had small chances of success when the position of the machine gun could not be accurately determined. In Switzerland a machine gun is considered equivalent to 50 infantrymen. Skirmishers are the most difficult target for machine guns to fight, and, at the same time, they are the most dangerous. When the fire is well observed, a good effect can, indeed, still be counted on, when the fire is directed at prone skirmishers at ranges up to 1000 m., but this is not true when the fire cannot be observed; in the last mentioned case, no effect worth mentioning is produced.

Austria. In a field firing test (which was repeated four times) between a machine gun (gun pointer covered by a shield) and 30 infantrymen, the following results were obtained at 600 m. in 1½ minutes:

Infantrymen.....	120 rounds.....	10 hits	(9%)
Machine gun.....	215 "	14 "	(7%)*

England. At the Infantry School at Hythe, in a firing test at 300 yards, lasting 5 minutes—perhaps the longest period during which continuous fire is possible—the power of a Maxim gun was found to be equivalent to 60 rifles. In field firing this comparative power dropped down to 25—35 rifles. In this connection, it should be borne in mind that moral

*Firing tests of the Army Musketry School at Bruck, a.d. Leitha, 1905. *Streffleur*, Apl. 1906, p. 524.

influences do not make themselves felt in firing under peace conditions, and that, on the other hand, a single favorable hit can place the machine gun out of action for a long period, while the skirmishers can keep up the fire.

3. INFANTRY VERSUS MACHINE GUNS.

It will rarely be possible to concentrate upon a machine gun battery of six guns a fire equivalent to its own. Because of the small target offered by machine guns, it is necessary for a firing line to concentrate its fire upon one machine gun at a time, thus gradually silencing the battery in detail. This procedure is feasible because it is very difficult for the machine guns to reach with their fire all parts of a well concealed skirmish line. The normal relation, unfavorable for the infantry, changes in its favor, however, as machine guns cannot keep up a high rate of fire for a prolonged period, even when nothing is considered but ammunition supply; as serious breaks are especially apt to occur when the gun is worked to its maximum capacity; and as the ammunition expended in one minute (3600 rounds) cannot produce an effect unless not only the correct range but also the proper elevation is accurately known.

The fight against machine guns may be advantageously conducted according to the following principles:*

1. Infantry skirmishers should conceal themselves so well that it will be difficult for the hostile machine gun battery to find them. Color of immediate vicinity (shade) and background should be considered; platoon and other leaders must

*Switzerland: Machine guns, "on account of their small gun squads, are more sensitive to losses than artillery. They cannot adjust their fire so easily as artillery, but, when once on the target, the effect of their fire is great.

"The principles governing the combat against artillery are applicable, in general, to the fight against machine guns. It may be assumed that at medium ranges, one platoon of infantry will suffice for silencing one machine gun, provided the platoon of infantry fights the action under favorable conditions. At short ranges, a few good marksmen suffice for silencing a machine gun. For this reason selected men are sent forward, when the situation permits, to sneak up to the machine guns and to pick off the men serving them."

not stand upright; objects that are clearly visible should be avoided.

2. It should be made difficult for the hostile machine guns to observe their fire (ricochets) and to measure the range. (No prominent features that would facilitate such measurements should be located near the infantry position).

3. The firing line, as far as this is possible, should not be continuous; the several parts of the line should be posted in echelon.

4. Kinds of fire: Lively fire at will should be used.

5. Expenditure of ammunition: At least 600 rounds should be expended against each machine gun.

6. At the outset a single company should concentrate its fire upon a single machine gun, picking out the one that is most clearly visible. Machine guns on the flanks are not good targets, as a strong wind may deflect the fire directed upon them.

The following rules, governing the conduct of infantry when exposed to machine gun fire, may be deduced from the above:

Even skirmish lines cannot continue their advance over terrain devoid of cover, when exposed within a range of 1500 m. to the unsubdued fire of machine guns; nothing remains but for them to lie down, and to gain ground to the front in groups, or one by one.

The same is true of route columns. They can only deploy to the right and left front at double time, and take cover.

The most unsuitable formation under machine gun fire is the column of platoons, whether lying down or in motion.*

If the column of platoons is reached by effective machine gun fire, when lying down, line must be formed. The men must not rise, however, to execute this movement, but the

*Within ¾ to 1 minute a column of platoons (lying down) sustained an average of 4.22% hits at 1400 m. and 4.31% hits at 900—1100 m. with 42 and 32%, respectively, figures placed out of action.

platoons should crawl forward into line. For the men to rise would mean annihilation.

The low target offered by machine guns makes them a difficult target for field artillery to hit, in spite of the accuracy with which the latter can adjust its fire.

4. MACHINE GUNS IN GERMANY.

The German machine gun (drawn by 4 horses driven from the saddle) is mounted upon a sled which forms the firing frame. On the march, this sled is placed on a wheeled carriage, from which it must first be detached (10—15 seconds) before the gun is used; in exceptional cases, the gun can be fired from the wheeled carriage.

The gun commander is mounted. Two of the gunners are seated on the axle chest of the carriage, their carbines buckled to the gun carriage; two are seated on the limber chest, their carbines slung over their backs. When surprised by a direct attack, all the men that can be spared form as skirmishers in the intervals between the guns of the machine gun battery. The machine gun can be served by a single man. The water in the jacket need not necessarily be renewed when the gun is fired for a short time only.

The machine guns can be used on any terrain passable for infantry. When detached from the wheeled carriage they can even surmount considerable obstacles. In action, they present no larger target than skirmishers fighting under similar conditions, and are capable of offering more resistance than infantry.

The sled can be carried or drawn by the men for short distances. The ammunition, placed in belts holding 250 rounds each, and packed in six boxes, is similarly drawn on an ammunition sled. If the conditions permit, the guns may be drawn by horses.

The "fighting battery" consists of six guns, formed into three platoons, and an ammunition platoon (three ammunition wagons and one store wagon); the combat train consists of officers' and other led horses. The field train consists of one

Machine Guns in Germany.

Lead Team Hitched to Gun.

Carrying the Machine Guns.

baggage wagon, one ration (commissary) wagon, one forage wagon, and a second store wagon.

The movements and gaits of a machine gun battery are the same as those of a field battery: the order in line, at close or extended intervals, in which the guns are abreast, the intervals between them, measured from center to center, being 5 and 17 paces, respectively. The order in line, at extended intervals, is used in moving to the front or rear; the order in line, at close intervals, for assembly, for movements in that formation, for parking, and for parade. The section column* is the principal maneuver formation on the battlefield; it is employed as an assembly formation on a road, and as route column. (Par. 320 German F. S. R.). In section column the guns follow each other at a distance of four paces. In addition to this column, a column of platoons is used, in which the platoons follow each other at a distance of 22 paces. (This may be reduced to 6 paces).

A machine gun battery has available 87,300 rounds of ammunition (10,500 rounds with each gun and 8100 rounds in each ammunition wagon, or a total of 14,550 rounds per gun), which may be drawn forward to the firing position upon sleds, in boxes holding 250 rounds each. The ammunition wagons are refilled from the ammunition wagons of the light ammunition columns of the cavalry division and from the wagons of the infantry ammunition columns marked with a red stripe, which carry ammunition for machine gun units. A reserve machine gun is carried with the ammunition column.

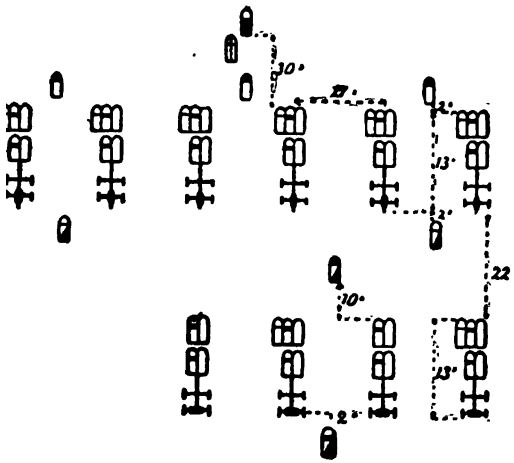
The machine gun battery combines high infantry fire power (approximately equivalent to that of the skirmishers of a German cavalry regiment, armed with carbines, or to that of 4—6 platoons of infantry)† with instant readiness for firing,

*The guns are placed in rear of each other, the ammunition wagons and other vehicles bring up the rear. *Translator.*

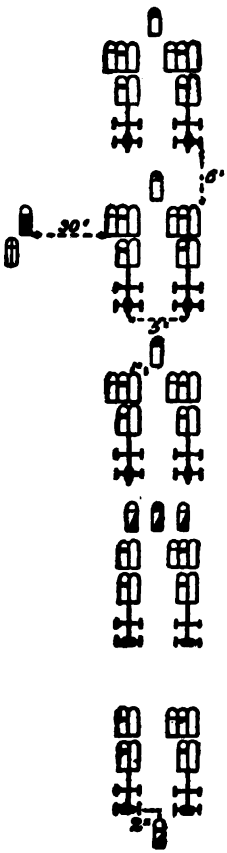
†A German cavalry regiment at peace strength numbers from 552 to 576 sabers; a platoon of infantry (on a peace footing) numbers from 48 to 53 men.

In making a comparison between a cavalry regiment and a machine gun battery, it must be borne in mind that horse holders are deducted from the strength given for a cavalry regiment. *Translator.*

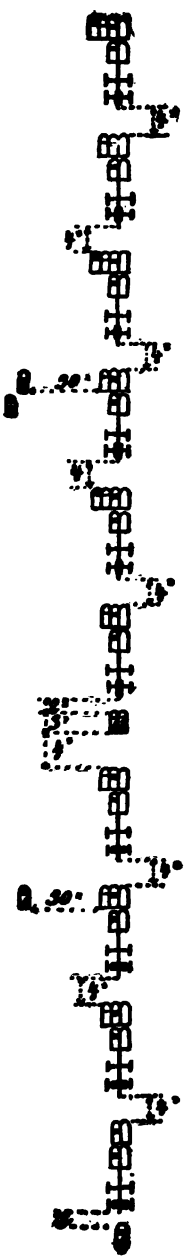
Order in Line
(extended intervals).



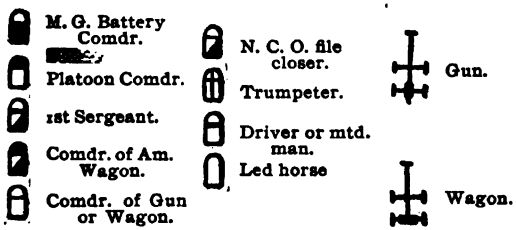
Column of Platoons
(closed up).



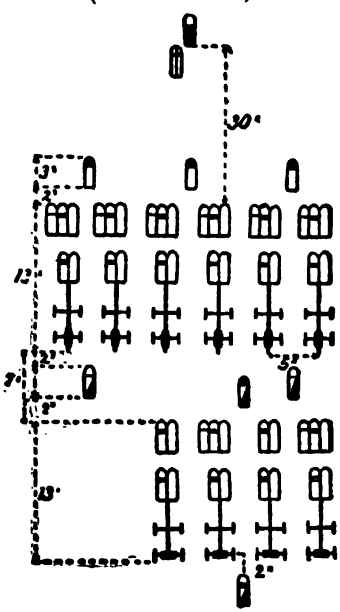
Section Column.
(Route Column).



Explanation of Symbols used:



Order in Line
(close intervals).



and a mobility which enables it to follow the mounted arms anywhere. The chance of producing a sudden fire effect within a short space of time must be especially utilized. Special efforts should therefore be made to place entire machine gun batteries into action. The employment of single guns is precluded owing to the danger of breakdowns. The employment of platoons is especially proper in defense as well as in action at short range.

The duties of machine guns naturally grow out of their tactical advantages. Their fire power should be saved for decisive moments, when the development of strong fire power at short ranges is requisite, and when the available time and the situation do not permit of pushing infantry into action. The machine gun batteries, which constitute an independent arm, and which are assigned to cavalry and infantry divisions, are best adapted for these duties.

The heavy matériel and the teams designed for rapid movements make the machine gun battery less suited for employment in infantry combat, where such a high degree of mobility is not so necessary. In the battle on the Shaho an employment of machine guns by platoons in the first line, came about quite naturally. The guns prepared the assault, reinforced weak points, and supported the advance. In Germany, provisional machine gun companies consisting of six two-horse machine guns, driven from the carriage (these guns cannot be fired from their carriages), have been adopted for this purpose. These machine gun companies are principally an auxiliary weapon of the infantry, and, distributed by platoons to the battalions, or sent into action as a single unit by the regimental commander, they serve the purpose of augmenting the fire of the infantry.

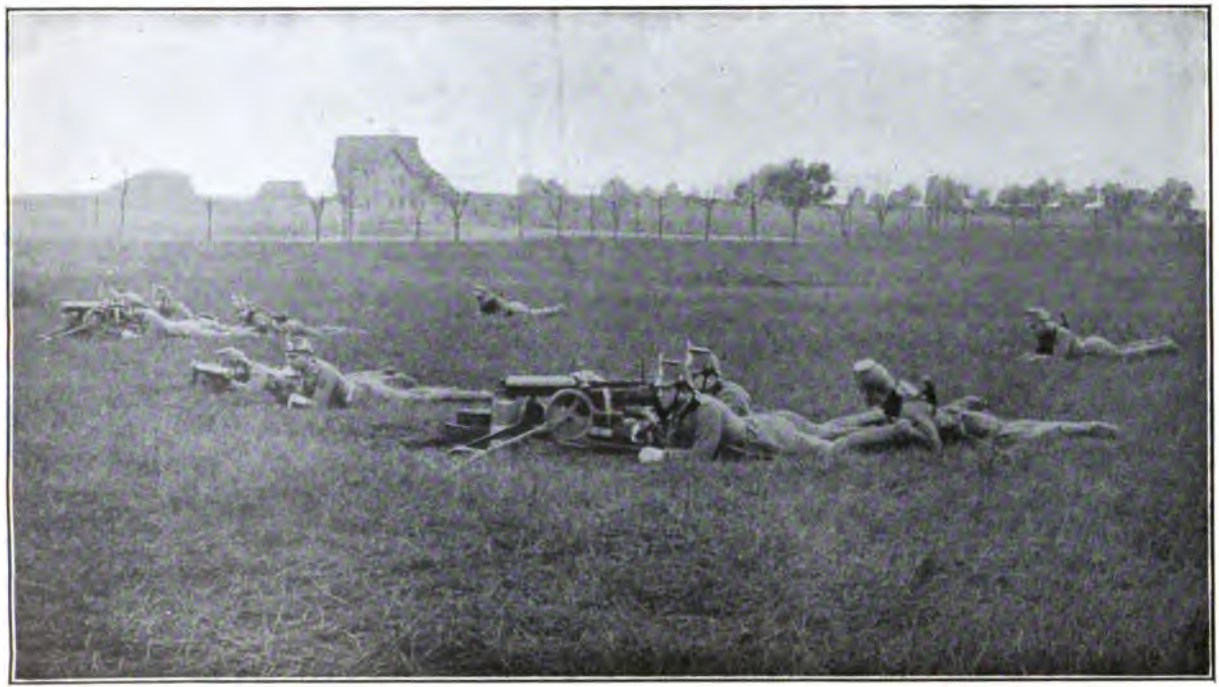
Movements at increased gaits are possible in exceptional cases only; as a rule, the guns follow the infantry at a walk, and in combats terminating in a defeat, it may frequently be impossible to keep them from falling into the hands of the enemy. The permanent assignment of machine guns to battalions does not seem to be advisable.

5. GOING INTO POSITION.

The principles which govern the reconnaissance and occupation of a position by field artillery are applicable also to machine guns. The tactical situation determines whether the guns should move into position under cover or in the open. As a rule, the interval between two adjacent machine guns in line is 17 paces; but the proper utilization of favorable cover does not preclude posting the guns close together. It may likewise be advantageous to post the guns in echelon on the flanks.

In action the carriages remain, as a rule, in the nearest cover in rear of the line. The advance from this point is effected by the men carrying or dragging the detached guns and ammunition sleds; under certain circumstances, it may also be advisable to have the guns or ammunition sleds drawn forward by single horses (mounts of gun commanders). On level ground the ammunition platoon and the wheeled carriages of the machine guns take post in rear of and as close as possible to the guns. Whether the two groups are combined, or whether the machine gun carriages should occupy the nearest, and the ammunition wagons the more distant cover, depends upon the available cover. The commander of the machine gun carriages sends full ammunition sleds to the firing line at an early moment and has empty boxes and belts brought back.

A Machine Gun Platoon Crawling into Position.



Range Finder.

A Machine Gun Platoon in Position.

A Machine Gun Platoon Intrenched.

6. THE FIRE FIGHT.

The machine gun squad consists of one gun commander and four gunners, numbers 1—4; number 2 is the gun pointer. The gun commander sees that the gun is set up for the prone, sitting, or kneeling fire position, according to the terrain, supervises the service of the gun, which can be served in any position of the body, and removes all obstructions that interfere with its effective use. The gun pointer handles the gun, *i. e.,* he loads it, sets the sight, aims and fires it. No. 3, who lies to the right of the gun pointer, assists the latter in these duties, places a box of ammunition on the right of the gun, and feeds the ammunition belt into the slot. When necessary, he takes the place of the gun pointer. No. 1 lies in rear of the gun pointer, keeps his eye on the battery and platoon commanders, and transmits their orders to the gun commander and gun pointer. No. 4 has charge of the replenishment of ammunition; he takes cover or lies down 20 paces in rear of, or on a flank of the gun.

The range finders, without special orders to that effect, measure the range to targets as they appear, or to fixed points, and call it out to the battery commander. The battery commander designates the target, the range, and the kind of fire to be used. The platoon commanders assign a section of the target to each of their guns, designate the elevation that is to be used, and supervise the service of the guns; they are especially held responsible that the fire is directed upon the proper target. Platoon commanders constantly observe through their field glasses the strike of the bullets and the enemy. The commander of the gun carriages is charged with their supervision; he constantly sends forward ammunition, and, when necessary, men and matériel, into the firing position. When the detached guns change position, he follows the movement under cover with the gun carriages, bringing them as close to the firing position as possible.

After machine gun batteries had been employed at maneuvers as an auxiliary arm of the cavalry, they did especially good work in the fights in Southwest Africa,* where they were not opposed by artillery.

Through their ability to follow a skirmish line into the densest thickets, they were a valuable support to the infantry in the close country in which the African fights took place, where artillery of necessity had to fail owing to absence of a clear field of view. It was demonstrated, however, that the machine gun squads became so engrossed in the work of serving their guns that supporting troops had to guard them against surprise.

In the engagement at the **Waterberg,** the machine guns did splendid work in meeting, with an effective volley fire, the sudden, energetic attacks made by the Hereros against the flank and rear of the Germans.

*Militär-Wochenblatt, 1904, Nos. 136, 139 and 140.

In two critical moments, during the attack against the left flank of the advance guard, and during the attack made with a yell against the right and rear of headquarters, it was principally due to the machine guns that the enemy, who had come within short range, was repulsed. Participants of this fight believed that the Hereros did not dare to make a real attack when machine guns went into action against them. It had been impossible to avoid using single machine guns. Just as the enemy was making an attack upon the 11th Company, machine gun No. 3 (2nd Machine Gun Battery), which had done splendid work, broke down. This was the only case of jamming that occurred. Although exposed to a galling hostile fire, the gun commander managed to change barrels in 30 seconds, and then to resume the firing. The 2nd Machine Gun Battery expended 20,775 rounds of ammunition; the expenditure of the different guns varied between 7350 and 120 rounds, according to the part taken by them in the action. The ammunition supply was certain and steady; no shortage of ammunition, not even a temporary one, occurred anywhere.

7. MACHINE GUNS IN OTHER COUNTRIES.

Switzerland. In 1892 Switzerland began to organize four mounted Maxim machine gun companies, which were assigned to the weak cavalry brigades (consisting of six troops*) on account of the defensive role of the Swiss cavalry and the lack of batteries of horse artillery. Three machine gun companies were assigned to the fortifications on the St. Gotthard and one to St. Moritz for the purpose of augmenting the fire of the advanced positions belonging to those fortifications, and to cover the approaches thereto.

A Maxim machine gun company consists of 6 officers, 105 non-commissioned officers and privates, 99 horses (24 pack horses and 24 draft horses), 8 guns mounted on tripods, and 7 vehicles (two of these are two-horse supply and baggage wagons, one four-horse field forge with field kitchen, 4 two-horse ammunition wagons, each carrying 15,520 rounds of ammunition). The guns and the ammunition are carried on pack animals. A packed gun horse carries a load of 108 kg. inclusive of 5 kg. of oats. An ammunition horse carries a load of 123 kg. inclusive of 5 kg. of oats and 8 ammunition boxes (each holding 250 rounds, or a total of 2000 rounds weighing 90.5 kg.). A machine gun company of eight guns is divided into four platoons, each consisting of two guns and four ammunition horses, and the combat train, consisting of four ammunition wagons and the field kitchen. Every gun is commanded by a "gun chief," and two of the five men belonging to the gun squad are horse holders. After the command "halt" has been given, 1—1½ minutes are required to get the gun ready for firing. The company carries 5940 rounds of ammunition for each gun.

*Eskadrons.

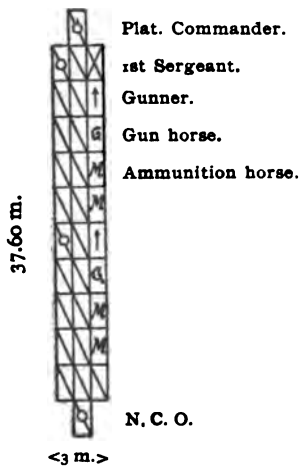
Switzerland

Machine Gun and Ammunition Horse.

Gun Commander and Gun Ready to Fire.

Route column from line is formed by the guns moving successively in the proper direction, the two ammunition pack animals following directly in rear of the gun to which they belong. The company takes up a road space of 150 m. For movements off the road the company may move in

Platoon in Route Column.



"mass," or with the platoons in "combat formation." When in "mass" the platoons, each in route column, are abreast, with intervals of 10—20 paces between them. When the platoons are in "combat formation," the two guns of each are placed abreast at equal intervals.

The three machine gun companies assigned to the line of fortifications consist of two to three platoons, each of four guns. A platoon consists of 2 officers and 60 non-commissioned officers and privates. The men are armed with rifles and equipped with alpine sticks. "Gun carriers" (*Waffenwarte*) carry the gun basket, which weighs 33 kg. The weight of the water in the jacket is only 1 kg. "Ammunition carriers" (*Munitionswarte*) carry the ammunition in specially constructed frames, each man carrying 500 rounds.

Kinds of fire: *"Fire by a single gun"* is employed at the opening of an action to drive away patrols and reconnoitering officers, when it is not desired to betray the presence of machine guns to the enemy.

"Volley fire" is the usual fire employed by machine guns and corresponds to the volley fire of infantry. After the target and the elevation have been designated, the platoon commander directs that fire be opened by calling the name of the gun pointer who is to fire. A pause is made after every series of 20—30 shots, which is used to make necessary corrections.

As soon as the proper elevation has been determined, *"rapid fire"* is opened. In this the *guns of a platoon fire alternately.* The fire is delivered in series of 100 rounds, and the time during which one of the guns is not firing is utilized by the non-commissioned officer with it to examine and oil the mechanism.

The *"fire at will"* (continuous fire) of the machine guns corresponds to the magazine fire of the infantry. *All the guns fire simultaneously* series of 50 to 100 rounds, interrupting the fire for a moment at the end of each series for the purpose of examining and oiling the mechanism; then they resume the fire with a new series of 50 to 100 rounds. On account of the great expenditure of ammunition entailed, and also in order to prevent the premature deterioration of the matériel, fire at will is used in exceptional cases only, for example, when danger is imminent, or when favorable opportunities offer.

"Progressive fire" may be employed against narrow, deep targets, when the range could not be accurately determined. It may also be employed for searching an area 100—200 m. deep.

Austria has begun to organize *cavalry and mountain machine gun batteries* consisting of four guns each. The machine gun Model 7 (*Schwarzlose*), with pack animal equipment, has been adopted. The gun horse carries 500, and each of the two ammunition horses, 1500 rounds of ammunition. During mobilization two ammunition horses are to be added for each gun. Mountain machine gun batteries are similarly organized; each ammunition horse carries 2000 rounds of ammunition. On the gun itself, and on the gun frame, 44 belts, each holding 250 rounds, or a total of 11,000 rounds, are carried.*

The formations employed by the cavalry machine gun batteries are the order in line (at close intervals), the combat order, and the route column.

The mountain machine gun batteries, carrying guns and ammunition upon pack horses, are equipped with tripod and basket mounts. These machine gun batteries combine the system of mounting and carrying employed by the Swiss cavalry and mountain machine gun companies. Three pack animals are employed to transport each gun with its ammunition. The gun squad consists of three men. Officers and non-commissioned officers are mounted; the other men of the battery are not. Unpacking the guns, posting them, and getting them in readiness for firing, is managed in a similar manner as in the Swiss machine gun companies.

The gun adopted for *infantry machine gun batteries* is the light and simple Schwarzlose machine gun, Model 7.

	Springs	Parts of breech	Screws & Pins	Weights
Maxim.	14	35	52	27.5 kg.
Schwarzlose.	1	11	13	17.5 "

Tripod mounts and pack animal transportation are necessary in view

*The Schwarzlose machine gun weighs 18 kg. exclusive of frame and the water in the jacket. (The Maxim weighs 28 kg.)

of Austrian theaters of war. The batteries consist of four machine guns.

"The great length of modern battle fronts, and the gaps and local combats along the latter, would seem to make a distribution of machine guns along the entire front desirable. Attention is thereby directed to organizing the machine guns to be employed with the infantry as 'Regimental Machine Guns.' Such an organization would best ensure the training of this new arm for the infantry combat and the prompt attainment of an understanding of its employment.

"In the cavalry, the difficulties of organizing, training, and employing machine guns are considerably greater than in the infantry. These difficulties are best overcome by organizing the machine guns assigned to cavalry into independent batteries, and placing them at the disposal of the higher cavalry commanders.

"In determining upon the size of the machine gun batteries attached to infantry, an attempt should be made to combine minimum size with adequate fire effect and maximum mobility. Two machine guns would seem to be almost the maximum number that should be posted at one point in an infantry action. From a tactical point of view, it is, moreover, undesirable to post a greater number at one point, because gun shields, steam, etc. would frequently form too prominent a target, for the hostile artillery to forego firing on it promptly and with telling effect.

"In connection with the desire for more than two machine guns in each infantry and Jäger organization—about two guns per battalion—the tremendous increase in ammunition trains should be considered. It would also be well to bear in mind that we have, as a matter of fact, not even become accustomed to the numerous ammunition columns of our rapid fire artillery.

"In the cavalry, the necessity of dividing a machine gun battery for the purpose of assigning the parts thereof to brigades, and of assigning machine guns to reconnaissance and other independent detachments, must be reckoned with. When we bear in mind that single machine guns are to be used only in exceptional cases, the machine gun battery intended for the cavalry cannot well be made smaller than four guns."*

England. During the **Boer war** 1—2 machine guns mounted on a high carriage were assigned to each of the British battalions. These guns were unsuited to employment in an infantry combat and were quickly silenced. The campaign demonstrated that these guns could frequently not be used, and that they stood idle in rear of the line. They were not combined into detachments for the purpose of supporting the attack, as should have been done, until the engagement at **Pieters Hill** (27th Febr., 1900). On account of the long range at which these guns came into action, the effect of their fire was indeed very small, but, nevertheless, its moral effect impaired the steadiness of the Boer aim. Since the great fire power of these guns can be brought into play only when several of

*_Streffleur_, January, 1908, p. 114, et seq.

them are employed together, it is not a good plan to assign single guns to cavalry regiments for the purpose of supporting the dismounted line in action. Only the commander of the entire force, and not each battalion commander, is able to judge where the employment of machine guns would be advantageous. The proposal to assign machine guns to the artillery was not followed, as it was justly feared that the machine guns would then be assigned tasks to which they were not adapted.

At the present time, each battalion has a machine gun platoon consisting of two guns. Both guns with their tripods, and a portion of the ammunition, are transported on one wagon drawn by two horses. They are in addition equipped with a two-horse ammunition cart. The complement consists of 1 non-commissioned officer, 15 privates, 1 saddle horse, and 4 draft horses.

Each battalion of mounted infantry has a machine gun platoon which is similarly organized. Each of the four vehicles of this platoon is, however, drawn by four horses. In addition, this platoon is equipped with six machine gun pack saddles for transporting the guns on pack animals. The complement consists of 1 officer, 1 first sergeant, 23 privates, 16 saddle horses, and 16 draft animals.

The machine gun platoon of a cavalry regiment consists of only one gun, which is carried on a four-horse wagon, and a four-horse ammunition wagon. The platoon is equipped with three pack saddles. The complement consists of 1 officer, 1 non-commissioned officer, 13 privates, 11 saddle horses, and 8 draft horses.

The following ammunition is carried by the British machine gun platoons:

	With the organization.	In the ammunition column of the F. A. Bns.	In the Division ammunition column.	Total No. rounds.
Infantry M. G. P.	11,500	10,000	10,000	31,500
Mtd. Infantry M. G. P.	19,500	10,000	10,000	39,500
Cavalry M. G. P.	19,500	10,000	10,000	39,500

Japan and **France** seem to have decided to follow the British in assigning machine gun platoons to regiments. In **Japan,** soon after the outbreak of the **Russo-Japanese war,** the Guard, the 1st, 2nd, 3rd, 4th and 6th Divisions, and the two independent cavalry brigades, had machine gun batteries consisting of 6 guns each. During the winter 1904-5, 320 machine guns were gradually placed in position, singly and by platoons, in the fortifications on the Shaho.

Russia. At the outbreak of the **Russo-Japanese war,** a machine gun company was assigned to the 1st, 3rd and 5th East Siberian Rifle Brigades.

This company consisted of 5 officers, 85 combatants, 13 non-combatants, 10 saddle horses, 29 draft horses, and eight guns. The latter were mounted on high carriages, and were protected by steel shields. Of the ammunition, 1350 rounds, in belts holding 450 rounds each, were carried on each gun carriage, and 4500 rounds on each of the six two-wheeled ammunition carts. The field train consisted of nine one-horse carts. The loss of the machine gun company at the **Yalu** was probably due to the fact that the guns, mounted on high carriages, were quickly deprived of their mobility in their second position, after they had, from their first position, effectively flanked the advance of the Japanese infantry. Immediately after this first lesson, the high wheeled carriage was apparently abolished, and the tripod adopted. On September 26th, 1904, the machine gun companies were reorganized. There were (old) wheeled, and (newly-organized) so-called "mountain machine gun companies," the latter having pack animal transportation. These companies were assigned to infantry and Rifle divisions and were designated by the numbers of their divisions.

On December 12th, 1906, the machine gun organization was again changed, because it was asserted that the assignment of machine gun companies to divisions hampered the division commander; that the employment of 8 guns at one point was injudicious; and that so large a machine gun battery actually induced a scattering of the guns. Infantry, Reserve, and Rifle regiments are each assigned a machine gun organization consisting of 4 guns, mounted on tripods, equipped with 6 mm. steel shields, with pack animal transportation.

Complement: 3 officers, 7 non-commissioned officers, 46 privates, 7 non-combatants, 10 saddle horses, 21 pack and draft horses (8 of these for carrying ammunition), 4 ammunition carts, and 5 train wagons. The personnel is drawn from a regiment in which the men to be detailed for machine gun duty are trained.

According to an officer who commanded a machine gun company in the battle of **Liao Yang***, his company went into position on August 30th, on the right flank of its division behind an earth embankment at the south edge of the village of Gutsealing, and 300 m. from the railroad running in a southwesterly direction. This position was taken up with the object of preventing the envelopment of the right flank of the division. Sufficient time was available for cutting down the kaoliang crop for 650 m. Beyond this range the kaoliang fields continued for several hundred meters. Directly in front of the position of the company there was a hill, upon which several mounted men showed themselves toward 10 A. M. As soon as fire was opened on them, they threw themselves down in a field covered with tall kaoliang. When these mounted men had reached a fairly open space, about 900 m. from the machine gun company, they could be clearly seen. In rear of them was observed a mountain battery of artillery, which endeavored to go into position on the hill mentioned, apparently with a view of directing a flanking fire on the Russian skirmishers farther to

**Russian Invalid*, October 1904.*

the front than the machine guns. Fire was opened at once, without first bracketing the target, the first gun firing at 1200 paces (about 850 m.), and each succeeding gun increasing the range by 25 paces, thus covering with fire a space 150 m. deep. Immediately after fire was opened on it, the mountain battery attempted to escape to the right, but succumbed to the fire of the machine guns. The latter had fired about 1½ minutes, and had expended 6000 rounds of ammunition. About noon, hostile (Japanese) skirmishers attempted to cross the railroad embankment, one by one, apparently with a view of flanking the machine guns. The latter opened fire on the Japanese, combined sights, and, for a short period, rapid fire with sweeping being resorted to. The movement made by the Japanese was discontinued; an advance made by groups against the front of the machine guns got only as far as the edge of the cleared kaoliang field. In the open, the skirmishers were unable to advance a single step; every attempt, on their part, to rise, was prevented. Whether it would have been possible to advance by crawling, while keeping up a constant fire, can, of course, not be determined now.

At nightfall the Japanese again advanced in the kaoliang field and annoyed the machine gun company throughout the night with rifle fire. At daybreak they were again driven back by a continued fire from the machine guns. The Japanese skirmishers remained in readiness, however, in the kaoliang field, and fired on any target that offered. When their fire became more and more galling, the machine gun commander decided to send forward a non-commissioned officer and 15 men (Reservists and horse holders, armed with rifle and bayonet) to drive them out. The undertaking was successful. It was found that this continuous annoying fire had been kept up by only 1 officer and 24 men.

At 3 P. M., several Japanese assembled at the railway bridge; a signal detachment also appeared. The fire at will of the infantry, directed on this body of men, had no effect whatever; but after two machine guns, one using an elevation of 1025, the other one of 1075 m., had fired on that point for a short time, the Japanese disappeared. At 5 P. M., the machine guns succeeded in repulsing an enveloping movement made against their right flank. This movement was betrayed only by the motion of the kaoliang stalks. Toward 7 P. M., the Japanese directed artillery fire upon the machine guns, which suffered considerable losses, although the personnel was protected by an earth parapet and had ceased to work the guns. This fire did not cease until nightfall, and, at 9 P. M., the position was evacuated by order. An attack made by the Japanese during the night found the machine guns gone. During the two days of the fight the company had lost 30% of its personnel, and had fired 26,000 rounds of ammunition, or only about 3200 rounds per gun during two days. The superiority of the fire of these machine guns over that of the Japanese skirmish line can perhaps only be explained by the small numbers of the latter.

In the defensive position on the **Shaho** and at **Mukden,** machine guns were employed in favorable positions, behind sandbag parapets and

under splinter proof roofs. According to Lieutenant-Colonel ANISINOW, good results were obtained against skirmishers up to 1050 m., against closed bodies of infantry and against troops of cavalry (*Eskadrons*) up to 1400 m.; against batteries of artillery, halted in the open, staffs, and columns, the fire was sufficiently effective up to 1960 m.

8. THE EMPLOYMENT OF MACHINE GUN BATTERIES.

Machine guns will never be able to replace artillery at long ranges; on the other hand, they will often find an opportunity to support other arms with their fire at medium and short ranges.

It has been asserted that machine guns do not always follow the movements of the firing lines in action, that the commander of a force is not always able to find a good position for them; and the question raised whether the space taken up by the machine guns and their ammunition wagons in a column could not be more profitably filled by companies of infantry or by a portion of an ammunition column of corresponding length. To be sure, machine guns are a special arm; the justification of their existence lies in the combination of constant readiness for firing with highly developed mobility, so that, held back under direct control of the commander of a force, they give him the means wherewith to produce within a short time a sudden effect, in the nature of a surprise. This is the very purpose for which machine guns were created. They are not intended for prolonged fire action, not for accompanying an infantry skirmish line in an advance by rushes, and, least of all, for fighting well covered firing lines. In addition, the fact that machine guns make it possible to concentrate fire quickly on any space, whereby the moral effect is considerably increased, ought not to be underestimated. It would seem to be advisable to employ machine guns in conjunction with infantry when it is impossible to develop a powerful fire on account of the conformation of the ground, but when such fire is desirable for commanding approaches or defiles; further,

when fire alone suffices for delaying the enemy (for example, in rear guard actions). In this case the guns may either be pushed far to the front, or may be used in defensive positions, which can then be held by a few men during the pauses in the fight.* Although machine gun fire may perhaps be relatively less accurate than that of a body of infantry, the value of pouring a large mass of projectiles on the enemy within a brief space of time should not be underestimated.†

Whether machine guns are distributed by platoons, or are employed as a unit under control of superior leaders, will depend upon whether it is contemplated to employ them in a purely defensive way for the purpose of reinforcing the several weak points, or offensively in fire surprises or in covering the flanks. The distribution by platoons has the undeniable disadvantage that single guns will frequently not find an opportunity to fire; that the difficulty of ammunition supply is increased; and that the combined employment of the several platoons will produce friction that cannot be easily avoided. On the other hand, in machine gun batteries of three platoons each, an employment by platoons is easy. Although a distribution by platoons is permissible in a passive defense, the employment of the guns by battery (company) against the flanks of the attacker permits the mobility and fire power of the arm to be utilized to better advantage. While a distribution of machine guns by platoons—if we except colonial and mountain warfare—is, indeed, cheaper, it generally leads to a useless frittering away of fighting units.‡

*At the Austrian Musketry School it was found that it was not easy for a body of troops to fire on targets illuminated by the shaft of a search light; few men possessed the requisite eyesight to make this possible. It would no doubt be practicable, however, to attach such men to the machine guns posted in a defensive position. A considerable increase in fire effect could thus be obtained.

†Platoon volleys, directed for one minute on figures advancing from 1200—1100 paces, resulted in 5, fire at will, in 1½, and machine gun fire, in 3% hits. The three kinds of fire, when directed against 30 prone skirmishers, resulted, in one minute, in 13, 18, and 10% hits, respectively.

‡Lieutenant ULRICH (retired), who participated in the fighting in Manchuria, voices the same opinion in *Jahrbücher*, March number, p. 285:

"The opinion has been quite prevalent that the organization of strong machine gun units is one of the most important requirements of modern battle."

Machine guns will be able to bring all their powers into play to the best advantage at the beginning of a rencontre, when, from their position as far forward as possible in the column, they are pushed to the front to occupy important points and to compel the enemy to deploy his infantry. The commander should, however, endeavor to withdraw the machine guns from the fight as soon as his own infantry has deployed, in order to avoid involving the guns in a protracted fire fight necessitating an expenditure of a great amount of ammunition and in which the accuracy of their fire would gradually suffer.* The proper sphere of machine guns lies in their employment as a separate arm, whether they are posted so as to flank an enemy, or are kept at the disposal of the commander as an ever ready reserve, which is pushed forward to keep the point to be attacked under fire, to meet a counter-attack, or—and to this use they are best adapted—to participate in the pursuit. Their employment is also proper in rear guard actions, since they are able to remain in position longer, for example, than rear guard infantry, whose energies are paralyzed by the thought of getting away from the enemy in time. Machine guns are much more independent than infantry on account of their ability to withdraw at an increased gait. On account of their greater staying power and the greater intensity of their fire, they increase the delay which the enemy suffers, as well as the start gained by their own force; they moreover enable their own force to get away from the enemy and to escape pursuit.

In employing machine guns in defense, it must be borne in mind that the guns are not adapted to carry on protracted fire actions; and that the advantage of the mobility of machine gun batteries cannot be properly utilized if they have been assigned, from the outset, a definite section to defend. As a rule, it will be advisable, in defense, to keep the machine guns

*This applies particularly to machine guns which have air cooled barrels. After four minutes of continuous fire, part of the projectiles, and after seven minutes all of the projectiles fired from a Hotchkiss machine gun go over the target (platoon). *Kriegstechnische Zeitschrift*, January number, 1907.

at first with the reserve, and to employ them later, as necessity requires, even by platoons, to reinforce the defensive line at threatened points, or, by battery (company), to prevent an envelopment, or to participate in offensive movements. This does not preclude the employment of machine guns during the preparatory stage of the engagement, for example, to command important approaches. When a covered withdrawal of the guns is assured, it will also be possible to post machine gun batteries in such a manner in front of, or to a flank of the main defensive position, that they can suddenly sweep with their fire the ground on which the opponent will probably place his artillery. Flanking machine gun fire can sometimes be employed for sweeping dead angles.

The provisions of the Austrian machine gun regulations correspond in the main to those of the German Army. In Austria special stress is laid upon the use of machine guns with cavalry, while in Germany they are in addition a mobile reserve. Machine gun batteries accomplish the principal objects which cavalry expects to attain by the assignment of infantry,* viz., relief from fighting on foot, great fire power, and mobility. Even in reconnaissance duty, machine guns will be employed to break down the resistance of the enemy in occupied localities and to augment the resistance of their own force in such places. During an advance, machine guns should go into position at an early moment in order to cover as effectively as possible (preferably from a flank) the approach and the deployment for the mounted charge. It is advisable to post the guns of a machine gun battery together, so as not to have numerous lines of fire interfere with the movements of the cavalry; this is especially emphasized by the Austrian regulations. Machine guns batteries, like horse batteries (artillery), remain with the cavalry divisions during a battle.

German machine guns are especially adapted for resisting cavalry, while guns transported upon pack animals are en-

*In regard to the employment of machine guns in the maneuvers of 1905, see *Streffleur*, 1906, May number.

tirely helpless on the march and when going into position, and require the support of the other arms. German machine guns, whether on their wheeled carriages or on their sleds, are capable of warding off cavalry. The fire of the guns should be distributed over the entire front of the mounted attacking line. Special attention should be paid to lines following the first attacking line, to the flanks of the guns themselves, and to covering the carriages when they are not with the guns. Machine guns are able to advance on open ground without regard to cavalry, so long as the latter is not supported by artillery or infantry, or is not so superior in force that it can attack simultaneously from several directions, or in several lines.

In action against artillery it should be borne in mind that artillery possesses an unquestioned superiority of fire at the longer ranges; at ranges at which machine guns are able to fire at all, they must seek to find protection under cover, or by distributing the guns. Artillery is very susceptible to flanking fire. When that arm is to be engaged, the machine gun sleds should be brought as close as possible to the hostile batteries. In this case it is, moreover, advisable to have large intervals between the machine gun platoons. The great mobility of the machine gun battery, when limbered, will sometimes enable it to take up a position from which it can flank the enemy. In distributing machine gun fire it would be well always to assign the same task to two guns. It is not a good plan to have all the machine guns sweep the entire front of a firing battery (artillery).

The opinions in regard to machine gun employment in field warfare—mountain and fortress warfare are not considered here—differ considerably. In **England** machine guns are attached to battalions, and Japan of late leans toward this mode of employment. In **Switzerland** machine guns serve in addition as a substitute for horse batteries, which their army lacks.

The **English** view is obviously affected by their experience in colonial wars.

The following are given as the duties of machine guns *in attack*:

1. The machine gun is above all to be employed at long ranges. In

open country it will seldom be possible for the gun to reach a position in the first line, where, moreover, the gun would offer too good a target. Covered terrain should be taken advantage of to get the gun close to the enemy. The advance of infantry may be supported at long ranges by machine gun fire (fire of position).

2. The delivery of volley fire against any point of the hostile position.

3. The warding off of counter-attacks or attacks made by cavalry.

4. The utilization of flanking positions.

5. The support of cavalry during delaying actions (ammunition being in this case a substitute for men) although the fire effect against low targets is very small.

6. The holding of captured positions.

In defense the isolated employment of machine guns at a distance from the organization is prohibited and their use against extended skirmish lines cautioned against. Machine guns are well adapted for protecting flanks and can be kept back as a reserve to prevent the advance of hostile reinforcements, to support counter-attacks, to direct fire against deep and dense targets, and, finally, to support the firing line in action at short range.

In defense the principal duties of machine guns will consist of—

1. Sweeping obstacles and commanding terrain which is specially favorable for the attack; flanking of salients.

2. Reinforcing weak points.

3. Firing on advancing hostile reinforcements.

The cavalry regulations, contrary to those of the infantry, also permit a massed employment of machine guns when ordered by brigade or division commanders.

"As a rule, it will not be advisable to open fire on isolated mounted men or small groups of approximately platoon strength, as this would betray the position prematurely. In action, machine guns may be employed in conjunction with dismounted skirmishers for the purpose of forming a supporting point for movements, a rallying position, or for protecting a flank. Finally, during an attack, machine guns may support the fire of the horse battery, on the outer flank of which they go into position, to serve as support, or to facilitate by their fire a withdrawal."

These official regulations are not entirely in accord with the views entertained in the army. The combined use of the machine guns of a brigade, such as quite naturally resulted in the engagement at **Pieters Hill**, is advocated by many. At the longer ranges, machine gun companies are to fire on favorable targets, discontinuing their fire when their object has been acomplished. In addition they are to cover the advance or withdrawal of the infantry; to fire on certain points of the hostile position; to act against the enemy's flanks in pursuit; and, in defense, posted in pairs,

they are to flank salient angles and make it difficult for the enemy to approach the obstacles.

In **Switzerland** machine guns are considered an auxiliary arm. "Our field army should be capable of accepting and sustaining battle in the mountains and on highland plateaus without necessitating the creation of numerous special detachments for that purpose. Machine gun companies should be a tool which can be used in the mountains and on highland plateaus, and which can be turned over for use to any organization."

The platoon is the firing unit; the company commander posts his platoons at large intervals and regulates their mutual coöperation. Fire, suddenly delivered from various points, frequently rather far distant from each other, is considered to have a particularly demoralizing effect; the scattered posting of the platoons makes it difficult for the enemy to combat effectively the individual platoons which are skillfully concealed on the terrain. "The indefinable, uncanny and confusing aspect of their appearance enhances the effect of the fire surprise." The defensive character is here especially clearly marked, for cavalry which counts in the first place on the offensive will prefer a combined employment of machine guns, so as not to be hampered in its movements by the various lines of fire. On the march, machine guns are posted as far forward as possible in the column; single platoons may also be attached to escadrons of advance guard cavalry, and, in exceptional cases only, to escadrons of reconnoitering cavalry. Machine guns, supported by weak cavalry detachments, may be pushed forward to occupy defiles; moreover, the machine gun company assigned to a cavalry brigade may be sent into action either as a whole unit, or it may be divided from the start or during the course of the fight. This machine gun company may also be attached to regiments, escadrons or platoons of cavalry charged with special missions, in which case it is, as a rule, broken up into platoons. The premature detaching of machine gun units is especially cautioned against. "The mobility of the machine gun unit is such that it is not at all dangerous to hold them back until the last moment before sending them to the actually threatened point."

The regulations deem a special support necessary for the machine gun batteries when they are sent on independent missions. Single guns are not to be so used. Machine guns, distributed by platoons, invest cavalry dismounted for fire action with a special power of resistance. It will frequently be advantageous to occupy the enemy in front with weakly supported machine gun batteries, while maneuvering with the main body of the mounted force so as to gain the enemy's weak point, and attacking him there with fire or a charge. In a cavalry fight Maxim machine gun marksmen, by timely, hold, and energetic action, will very often be able to create favorable conditions for their own troops, facilitate the selection of a point of attack, and retard and interfere with the hostile deployment.

The following statements taken from the regulations for the *Service and Training of* **Swiss** *cavalry* (1904) are of interest:

"Machine guns invest pursuing cavalry with tremendous power.—Their violent fire, suddenly breaking forth, especially when quickly delivered at the flanks of the retreating mass, must have an annihilating effect and convert the retreat into a rout.

"In a retreat, Maxim gun marksmen with their guns can quickly occupy rallying positions (when possible, flanking), which, thanks to their mobility, they are capable of holding longer than other arms. Thereby they facilitate for the other troops the critical breaking off of the engagement.

"The retreat will proceed with greater steadiness and time will be gained for organizing resistance and for making that resistance more obstinate.

"When, during the crisis of battle, every available man joins in the fight, machine guns may take a hand in it, even when the terrain is unfavorable for the employment of cavalry, by gaining the flanks at a rapid gait, turning and firing upon the hostile flank or the hostile masses launched for the counter-attack.

"It would be incorrect, however, at such a moment, simply to throw the machine guns into the fighting line or to a flank. By doing this the mobility of the guns would not be utilized, and they would lose their character of a mounted arm.

"The assignment of machine guns to cavalry augments the fighting power and independence of the latter and increases to the utmost its desire to go ahead, its enterprise and bold initiative. With the aid of machine guns, our militia cavalry, even when opposed by better drilled cavalry, can go into battle calmly on our terrain, with the firm conviction of defeating it.

"But a cavalry leader should never shrink from sacrificing his machine guns when the object to be attained requires it, and when no other means remain to save the force. *These weapons should never be more to him than a welcome and powerful aid toward the fulfillment of his mission. Cavalry which degenerates into a mere support for its machine guns has ceased to be cavalry.*"

VII. INFANTRY VERSUS CAVALRY.*

(Par. 451 German I. D. R.).

The individual infantryman whose rifle is loaded and who knows how to use his bayonet is more than a match for the individual mounted man even on open ground; and, if he remains cool, retains his presence of mind, and uses his rifle properly while keeping the opponent constantly in view, he is even superior to several mounted men. Infantry which retains its steadiness has nothing to fear even when outnumbered by cavalry. Its main strength lies in steadily delivered fire, while cavalry relies on the possibility of making an unexpected rapid charge, on quickly covering great distances, and on the moral effect which its irresistible onslaught undoubtedly produces upon infantry. So long as there is a possibility of surprise and misunderstanding, of infantry allowing itself to become discouraged, and of the individual soldier being exposed to hunger and hardships, so long will cavalry that is energetically led be able to gain brilliant victories. Tactics would look differently upon the possibility of making a mounted charge during a battle if one or two German cavalry divisions had been on the Japanese side during the pursuit after Mukden. "If we demand of infantry that it close with the enemy after it has suffered tremendous losses, why should we not demand the same of cavalry whose mobility is disproportionately greater." (*Skobeleff's Order for the Day, June 15th, 1882*). The less the world believes in a victory of cavalry, the greater the certainty of such success. The troops should be accustomed in time of peace to the sight of charging cavalry. The recom-

*Taktik, II, p. 137: *Die Attacke der Kavallerie auf Infanterie.* For examples from military history consult the splendid works of Major KUNZ, especially *Die deutsche Reiterei*, and *Kriegsgeschichtliche Beispiele*, 5.

mendation made by the late General Dragomirov of the Russian army is, at any rate, worthy of consideration.* He proposed that cavalry ride at full speed through infantry lines deployed with three paces between files. Some infantrymen are, indeed, bound to be injured in such charges, but the wounds produced are not likely to be serious. Infantry accustomed to such charges will not lose its steadiness so easily in action as when it comes in contact with cavalry for the first time on the battlefield.

The success of the charge made by Captain Bechtoltsheim of the Austrian army at **Custozza** with three platoons of Sicilian Uhlans, may be ascribed principally to the fact that the Italian infantry was not accustomed to field service and lacked training. This small force of cavalry broke entirely through Pisa's deployed Brigade (Italian) and struck the route column of Forli's Brigade, throwing it into complete panic, so that of five battalions only one remained intact. The three platoons of cavalry, which numbered about 100 sabers, lost 2 officers, 84 men, and 73 horses killed and wounded. The charge made by three escadrons of the Dragoons of the Guard at **Mars-la-Tour**, to facilitate the retreat of the defeated 38th Brigade, and that made by two platoons of the 7th Hussars at **Sapignies** were likewise successful.

Any formation that permits effective firing is suitable for warding off cavalry. Skirmish lines through which a cavalry charge passes suffer losses that scarcely deserve mention. The fight is not hopeless even when the hostile troopers halt within the ranks of the infantry. When cavalry has charged through a skirmish line, the latter should be careful not to face about to fire at the troopers,† as that would give a second cavalry line an opportunity to approach and strike it unawares.

The supports in rear of the first line form the objective of the cavalry after it has charged through the firing line. These supports must therefore open fire on the cavalry regardless of the skirmishers in front.

**Vorbereitung der Truppen für den Kampf*, I, p. 55.

†"The French firing lines through which the cavalry had charged (evening attack made by Rauch's Brigade in the direction of Rezonville on August 16th, 1870) fired after the Hussars, while the French infantry units in rear fired in the opposite direction. The result was a frightful cross-fire, which, while undoubtedly disastrous for the Hussars, certainly must have worked havoc among the French." KUNZ, *Reiterei*, p. 153.

The flanks of a firing line can be bent back only when that line is not exposed to hostile infantry fire. The threatened wing should never be bent forward since that interferes with the fire of adjacent units. The task of repulsing an attack directed against a flank had best be left to the supports in rear of the flanks. The German Cavalry Drill Regulations (par. 349) state, that toward the end of a fight the bulk of the supports and reserves will have been absorbed by the firing line; that the fire that such a line could direct toward a flank would be insignificant; and that at any rate a *new* firing line could not be formed within a short time; and, therefore, that a charge against its flank would be advantageous. This statement should be a warning for us always to retain echelons or machine guns in rear of the flanks. The most critical situation for infantry is that in which it is charged by cavalry while retiring defeated under hostile fire with no supports available to repulse the attack. A halt means annihilation; it must be left to each individual to save himself as best he can.

During the battle of **Scheinovo,** three companies of the 11th Russian Rifle Regiment made an unsuccessful attack and had to retreat under the pursuing fire of the Turks, while Turkish cavalry began to charge their left flank. When only 200—300 m. from the Turks, the 4th Company, which was most seriously threatened, halted and formed square as if on the parade ground. During this maneuver, all the officers and many non-commissioned officers were either killed or wounded. The heavy losses of the battalion (50%) may, in the main, be ascribed to this halt under the most violent fire of the enemy.*

When the cavalry charge comes more from the front, however, the hostile infantry and artillery will have to stop firing, and it may then be possible to rally or re-form the defeated force, provided the men will heed their leaders.

Units in close order can deploy quickly toward the front or flank for the purpose of firing. However, they will be able to fire in close order only when not themselves subjected to hostile fire. The front and flanks of a body of infantry in proper

*KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg*, I, p. 166.

formation are equally strong, but, in this connection, it should be borne in mind that a deployment toward a flank, for the purpose of firing, always takes time and is apt to impair the steadiness of the men.*

If time admits, a position may be looked for near obstacles, such as ditches, hedges, swampy ground, etc., which impede the hostile cavalry. It is not necessary, however, for the infantry to occupy the obstacle itself; in fact, it is better to take up a position some distance away. The shortness of our rifles obliges us to form the firing unit at right angles to the line of advance of the approaching cavalry, and to avoid aiming obliquely. The provision contained in a number of drill regulations, including the French, that the bodies in close order (supports, reserves) should be formed in echelon, is objectionable, as this is apt to lead to their firing on one another (as the French infantry did in repulsing the charge made by Bredow's Brigade and the Dragoons of the Guard at Vionville). The deployment from "broad" and "deep" column to meet a sudden cavalry charge can, as a rule, be ordered directly by company commanders on the caution of the battalion commander, the method of meeting the attack being promptly decided upon. The main thing is to be in instant readiness for firing and to protect the flanks by means of echelons.

In a deployment from "deep column," the measures taken by the commanders of the rear companies must conform to those of the leading companies. To meet a cavalry charge coming from the right front, for example, the following scheme would be appropriate:

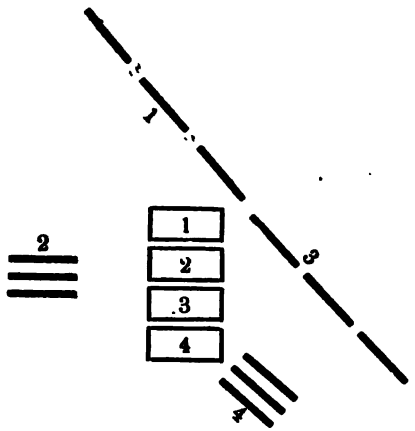
The 1st Company forms left front into line so that its front is at right angles to the line of advance of the cavalry;

The 2nd Company forms as a support in rear of the left flank of the first company;

*General VON SCHERFF (*Kriegslehren,* II, p. 263) believes that a frontal charge made by cavalry of sufficient strength has better chances of succeeding than a charge in deep formation against a flank. In a frontal charge, the suddenly appearing cavalry is exposed "only to the fire at will of individual skirmishers whose continuous front masks the fire of units in rear. In the other case (charge against a flank) the cavalry receives not only the fire of the closed bodies first encountered, but also that of the supports firing through the gaps between these groups. The frontal attacks executed with superb gallantry by the French cavalry at Sedan rather prove the opposite.

The 3rd Company forms right front into line, and prolongs the line of the first company;

The 4th Company also forms right front into line, or is held in readiness as a support in rear of the right flank. In this way the approaching cavalry can be met by the fire of from six to eight platoons.



It is a very simple matter to ward off a cavalry charge directed against the flank of a marching column (form line by wheeling by squads). When the cavalry charge is directed against the head or the tail of a column, as recommended by the German Cavalry Drill Regulations (par. 350), there will not be time enough, as a rule, for the entire company or battalion to form line. It will suffice to let the leading elements form line, the rear elements moving out of the column and forming in rear of the flanks as supports.

Successful resistance does not depend upon the formation taken up; in fact the latter is of importance only when it increases the feeling of security. The morale of an organization is of more importance than the formation taken up. A proud confidence in victory and morale are the only factors which decide success, and the training of infantry should be such as to develop these qualities.

Cavalry will in many cases consider that it has gained a success if it causes infantry to discontinue a movement, or to

take up formations which interfere with the highest development of its fire, or which offer favorable targets to the hostile infantry and artillery. This is especially the case where infantry is in the act of beginning an assault, when the slightest hesitation may jeopardize success. If cavalry actually begins to charge at this moment, only the bodies immediately threatened halt at the signal "attention,"* and face the cavalry; the remainder continue the march.

The sudden appearance of a line of charging cavalry produces such a tremendous psychological effect on troops not immediately threatened, that they either watch the attack passively, or else too many of them take a hand in repulsing it. This moment, in which the attention of the troops is so completely riveted on the cavalry, is seldom utilized for the purpose of gaining ground to the front, or for effecting a withdrawal.† It needs but little imagination to picture to one's self the success which the French army could have gained at Waterloo if infantry masses had followed on the heels of Ney's cavalry squadrons. In the battle of Vionville the German infantry fired at the most incredible angles at the charging French Guard cavalry. While Bredow's Brigade was making its charge during the same battle, part of the infantry of the 6th Division stopped firing on the French skirmishers, to follow with intense interest the cavalry charge that was taking place on a totally different part of the battlefield. This conduct, as

*The German army is the only one that employs an appropriate signal for this purpose. The attack made by the 28th Infantry Brigade against the wood of Bor at Königgrätz is very instructive in this connection. HÖNIG, *Taktik der Zukunft*, p. 56. At the signal, "cavalry," the threatened portions of the brigade halted and formed square. Fortunately the Saxons had already begun to retire from the edge of the wood. A stray hostile escadron had caused all the trouble.

†"Every leader should carefully watch the progress of a cavalry charge, and, as soon as he observes that friendly cavalry has succeeded in penetrating the hostile line or that the enemy is shaken and directs all of his fire against the charging cavalry, he should immediately advance to the attack and be upon the enemy with the bayonet before the latter recovers his senses. Such an attack will not have been made in vain, even if the cavalry has been repulsed." General GURKO'S comments on the maneuvers of 1893.

Prince FREDERICK CHARLES, in his *Winke für die Offiziere der unter Meinen Befehlen ins Feld rückenden Truppen* (1870), also demands that the infantry should quickly follow up cavalry attacks.

natural as incorrect, suggests the advisability of profiting by such moments of the enemy's inattention for the purpose of executing a movement or holding him with our own fire. It also seems absolutely necessary to support with rifle fire the charge made by one's own cavalry, or at any rate to prevent the hostile infantry from firing undisturbed on our troopers.

There are other reasons, however, why a sharp lookout should be kept during a hostile cavalry charge. All cavalry drill regulations recognize that a charge has greater chances of succeeding when it is made in deep formation, in successive lines, or simultaneously from several directions. The fire of the infantry is distributed, and, unless a good lookout is kept, a part of the cavalry, scarcely or not at all molested by fire, may perhaps succeed in driving the attack home. This will be the case when infantry allows itself to be enticed into developing a heavy fire in a direction from which only a feint is made, while the main attack comes from another, or from several other directions. Well led infantry will, therefore, never employ more rifles in repulsing cavalry than are absolutely necessary, while the mere threat of a cavalry charge will induce badly led infantry to develop an excessive volume of fire.

On open terrain, when the approaching cavalry is visible at a considerable distance, and when the infantry itself is exposed to effective fire, the prone aiming position is to be preferred. The men lying flat on the ground are not so easily wounded by the hostile troopers, and the horses will generally avoid stepping on them, besides which, the danger space is greater than when the men fire standing. In rolling or close country, where cavalry cannot be seen by men lying down, the aiming position kneeling or standing should properly be assumed. The losses inflicted by hostile fire must then be endured. Horses and riders are more apt to lose dash when charging an upright human wall that is spouting fire, than when charging a kneeling or prone opponent who scarcely offers an obstacle to the charge. What is of greater importance, however, is that men

standing upright can more easily execute a change of front, fire on passing cavalry, and use their bayonets in case the cavalry actually penetrates their line. The British and Italian regulations very properly prescribe that the front rank of a body of infantry in close order should kneel in such cases.

As the success of infantry depends to a great extent upon the steadiness with which it receives the cavalry, it would seem to be advantageous to withhold the fire until the cavalry gets within short range.* General Dragomirov says in his forcible manner, "It is not the bullet which has been fired, but the bullet which is still in the rifle-barrel, and reserved for short range, that harms charging cavalry." If infantry in line was able to repulse a cavalry charge in the past at 40 paces, with smoothbore muskets and at the first volley,† the chances of doing this with modern rifles would be still greater, if the "stopping power" of the 8 mm. projectiles were absolutely certain at short ranges. As this is not the case, it is necessary to open fire at an earlier moment.‡ If infantry does

*"The best preparation against rapidly executed mounted charges is for all commanders to keep their eyes open, quickly and coolly to size up the situation, and to act with determination. All precipitation or haste would be disastrous, for it would communicate itself to the troops. Infantry has never yet fired too late upon cavalry." Feldzeugmeister v. WALDSTÄTTEN.

†At Sedan, the 5th Company of the 46th Infantry fired only at 140 and 80 paces, and repulsed the charge. *Geschichte des Regiments Nr. 46*, p. 186. In the same battle the 9th and 12th Companies of the 87th Infantry repulsed a charge at 60 paces. *Gen. St. W.*, II, p. 1217.

‡The *France Militaire* contains the following statement in regard to the effect produced on horses by bullets from the French Lebel rifle in the engagements near Casablanca in 1907: "Many officers serving in the field observed that the small caliber bullets stopped horses only when a foot had been shattered or when a vital organ had been hit. *At Casablanca, horses that had been hit by several bullets continued to gallop for a long while.* This is a remarkable phenomenon, for the gentlemen of theory count as out of action every horse that has been hit by a projectile. This is entirely incorrect. *Many wounded horses carry their riders into the melée and do not die until the day after the fight.* This was observed on the French as well as on the Moroccan side.

"Troopers charging full tilt, with the firm determination of penetrating the hostile line, are not stopped so easily. In the first place, they would have to be hit, and that, in itself, is not such an easy matter. This is still more difficult for the infantry, if it knows the dash of the hostile troopers. Let us cultivate the dash of our cavalrymen, even if unreal situations are thereby produced in our peace exercises. If, on the other hand, we teach our troopers in time of peace to turn tail in the face of imaginary projectiles, we are training our cavalry for panic in time of war."

not fire until cavalry gets within very short range, it will have to reckon with the fact that even wounded horses will still be able to carry their riders into its ranks. However, for purposes of instruction in time of peace, it is proper to open fire late. If an infantry unit is trained in time of peace always to open fire at the medium ranges on charging cavalry, the unexpected appearance of hostile cavalry at short ranges in actual war, is more likely to bring disorder into the ranks of such a unit, than if it is trained in time of peace to reserve its fire until the cavalry has come within short range.

At **Garcia Hernandez** (1812), a French square was broken by a wounded horse falling down within the ranks of the infantry. This is, however, only true of closed bodies of infantry formed in two ranks. Horses will frequently break through a skirmish line—whether or not the horses are wounded is immaterial. Men are wounded in such an event in exceptional cases only, and the wounds produced are generally insignificant.

The following episode shows the effect produced on cavalry when it attacks unshaken infantry which is in good formation and reserves its fire. During the retreat after the battle of **Jena**, on October 28th, 1806, the Grenadier Battalion *Prinz August*, threatened by hostile cavalry, did not feel equal to continue its march to Prenzlau and attempted to cross the Ucker farther down. In the expectation that a cavalry charge would be made, square was formed and the officers were told not to fire until the cavalry had approached to within 20 paces. "Meantime, the French cavalry—the brigade which had crossed at Golmitz as well as the remainder of Beaumont's Division, under its commander, in all nine regiments—approached. The first charge was made by nine escadrons under the division commander. They approached at a gallop. When the expected fire did not come, the dragoons gradually reined in their horses, so that finally they were going no faster than a slow trot. At 30 paces the command "Fire" was given in the infantry and quite a number of troopers fell, the rest galloping by the square on both sides. Eight subsequent charges were repulsed in a similar manner."*

We have moreover to consider, in this connection, the strength of the infantry, the formation of the cavalry, and whether the latter charges from several directions or in sev-

*VON LETTOW-VORBECK, *Der Krieg von 1806-7*, II, p. 279. The charge of the 5th Lancers at Beaumont forms a counterpart of the above. KUNZ, *Kriegsgeschichtliche Beispiele*, 5, p. 18.

eral successive lines. A small force of infantry, especially when it may anticipate attacks from several directions, must open fire sooner than a strong infantry force which has to contend with an attack coming from one direction only. In the first mentioned case, an attempt must be made to meet quickly, one by one, the attacks which follow each other at intervals.

It is quite a different matter when the infantry itself is not directly threatened, but can take a hand in repulsing a cavalry charge made on another unit; then it is advisable to open fire at an early moment in order to break the momentum of the charge at long range. (11th Jäger-Battalion at Wörth; 8th Company of the 46th Infantry at Sedan).

This in part determines the rear sight elevation that should be used. The sights should not be changed on the battlefield, although this has been done on the drill ground by well trained soldiers without impairing the continuity or accuracy of the fire. According to the table of ordinates of the trajectory (par. 23 German I. F. R.), a bullet fired when the sight is set at 700 m. and aim is taken at the feet of the horse, does not rise above the height of a mounted trooper throughout that entire distance. The bullets may pass entirely over the target however, when the men take too full a sight in the excitement of battle, or when, in rolling country or terrain covered with grass or crops, they cannot see the bottom of the target and aim above that line. It is better, therefore, to aim at the breast of the horse, with sights set at 600 m., and to fire as soon as the target gets within 800 m. On account of the excitement attending every cavalry charge, it is not advisable to change sights.

It is a good plan to fire one volley first and then to employ fire at will. It is not easy for infantry, while awaiting the onrushing mass of cavalry, to reserve its fire until, in the opinion of the leader, the first shot may be fired. But this waiting is of great importance to prevent the fire from becoming wild and ineffective. Since the elimination of powder

smoke, there is no reason why other volleys should be fired after the first, for in the excitement of the fight the volley cannot produce a moral effect. The horses certainly find the rattling of fire at will more unpleasant than the sudden crack of a volley. The advantage of the volley, of permitting a unit to be kept better in hand, may be an important factor under certain circumstances however. The volley should, as a rule, be used by supports that are not exposed to fire. (8th Company of the 32nd Infantry at Wörth; the 1st and 2nd Companies of the 83rd Infantry, and the 5th Company of Jägers at Sedan).

Since the principal object of the fire is to destroy the cohesion of the charge, and as cavalry always closes toward the center while charging, no special importance need be attached to the distribution of the fire.

As regards relative numerical strength, a platoon of infantry consisting of 60 rifles (firing 360—500 rounds per minute), should be a match for 1—3 escadrons, and a company of infantry, under favorable conditions, may be able to deal with a cavalry brigade.* Cavalry can become dangerous for infantry only when the infantry is surprised, finds no opportunity to fire, loses its steadiness and morale, or attempts to reach cover by running.

The Charge of the French Cuirassiers of the Guard at Vionville.

At half past 12 on the afternoon of August 16th, 1870, the companies of the 10th Prussian Infantry Brigade were advancing east of Flavigny towards the Metz—Mars-la-Tour *chaussee*. As French infantry was not on the spot to put a stop to this movement, the 3rd Lancers and the Guard Cuirassier Regiment received orders to attack. The former regiment went to the rear, as no definite objective (?) had been assigned to it.

The Guard Cuirassier Regiment was formed in two lines, 150 m. distance between them, with two escadrons in each line, a fifth

*A German cavalry brigade consists of eight escadrons. *Translator.*

escadron following as a reserve. Although hampered in its movements and thrown into disorder by abandoned baggage wagons and other camp litter that covered the ground, the regiment nevertheless made the charge with superb gallantry.

The charge struck the 6th and 7th Companies of the 52nd Infantry, under Captain Hildebrand. These companies, rifles in hand and their leader in front, awaited the French cavalry, which came into view at a distance of 1200 m. The first echelon (6th and 4th Escadrons) was received with rapid fire at 250 paces. On the right, the 6th Escadron approached to within 60—80 paces of the Prussians, but a part then turned to the rear while a few troopers turned to the left. It is said, that of the leaders only one officer and one non-commissioned officer remained in the saddle, and that only twenty cuirassiers were rallied after the charge. The left escadron missed its objective completely. The Prussian rear rank faced about and fired on some French troopers who attempted to make an attack from the rear and who now also received fire from other units of Prussian infantry.

During the charge, the distance between the first and second lines had become greater than at first ordered. When the first line broke in two, the second was still some 300 m. distant from the Prussian infantry and suffered some losses, probably from stray shots, which did not stop the movement however, as the fire soon ceased. German accounts, to be sure, do not mention that the second line could not be seen on account of the powder smoke, and that the fire was discontinued to let the smoke clear away. When the French line was 100 m. away it received the command *charge* and the Prussian infantry again resumed its rapid fire, which shattered the attack, the leading troopers breaking down in a ditch about 10 paces in front of the Prussian line. The third line, its cohesion impaired and its advance hampered by fallen horses and riders, was just as little able to reach the Prussian companies. The right wing of the Cuirassiers raced around the left flank of the companies of the 52nd Infantry and encountered the Füsilier Battalion of the 12th Infantry, deployed in a single firing line, dense in the center. Some parts of this battalion formed squares. The charge was definitely stopped by the fire of this battalion. An attempt to rally the Cuirassiers was prevented by Prussian cavalry which now moved out. The French regiment, which had begun its attack with 575 sabers, had lost 22 officers, 208 men (36.2% of its strength), and 243 horses. According to Dick de Lonlay,* after this charge, the regiment was able to form only 4 escadrons of 62 troopers each, instead of 5 escadrons of 115 troopers each, which would mean a loss of 248 men. The first line had suffered the heaviest losses; in the 4th Escadron, which had lost all of its officers and non-commissioned officers, only 18 men were left.

*_Français et Allemands_, III, p. 84. KUNZ, _Kriegsgeschichtliche Beispiele_, 5, p. 11. The French _Gen. St. W._, II, pp. 301—309, gives the losses as 18 officers, 170 men, and 208 horses.

A charge has a better chance of succeeding if it is prepared by artillery fire.

During the attack made by two escadrons of Landwehr Hussars against the Its Battalion *Gyulai at* **Tobitschau,** an Austrian square was broken by shells before the cavalry penetrated it. During the attack of Bredow's Brigade at **Vionville,** the artillery was able to send its last shells against the enemy immediately past the right flank of the cavalry brigade.

The employment of cavalry in masses, contemplated in all armies, compels us to consider the case when infantry must advance over open ground in the face of hostile cavalry. Special units must then be designated, who, by means of long range fire, repulse the cavalry or keep it at a distance. At Minden (1759), Anglo-Hanoverian infantry succeeded in driving the hostile cavalry from the field, and at Vauxchamps and Etoges (14th February, 1814), Prussian infantry succeeded in breaking through the French cavalry. It will be easy to do the same thing with modern weapons, so long as cavalry is not very superior in numbers, and is not supported by infantry, machine guns, or artillery.

Infantry attacking dismounted cavalry should endeavor to bring long range fire to bear on the led horses or threaten them by a flank attack. For infantry to prolong the action at long and medium ranges is only playing into the hands of the cavalry, and besides, the better marksmanship of the infantry is bound to make itself felt at short ranges. When the infantry has once gotten to within 700 paces (560 m.) of the dismounted cavalry, it is very doubtful whether the latter will still be able to mount; at the very least, it will be difficult for it to do so (par. 362 German C. D. R.), even though the withdrawal can be effected under cover, or when fresh troops take a hand in the fight.

Provisions of Various Regulations.

England. The possibility of a successful cavalry charge is almost universally contested. When necessary, the skirmishers that are immediately threatened close in toward the center. Bayonets are to be fixed. An opportunity for successful employment of cavalry is offered when infantry has fired away all of its ammunition; when it is forced to retire; and when the approach of the cavalry is facilitated by dust, fog, or heavy rain.

Austria. *Brave and steady infantry has nothing to fear from cavalry charges, so long as it retains its steadiness, presence of mind, and morale, and delivers its fire steadily and with good aim at short range.*

When fighting cavalry, movements and changes of formation should be ordered only when sufficient time is available, and then only for the purpose of bringing a sufficient number of rifles into action and for better utilizing the terrain. When a cavalry charge is suddenly made from a short distance, it is better to remain in a narrow formation than to deploy hastily, provided the fire is delivered with steadiness. As cavalry frequently attacks only for the purpose of forcing the infantry to discontinue its advance, or to induce it to take up a close order formation, all units not immediately threatened by the attack should continue their movement or remain in their positions.

When a force has to cover long stretches under conditions which make it probable that a cavalry attack will be made, the battalions, companies, or platoons should be so grouped that they can quickly meet the cavalry attack in any direction, and can mutually support each other in warding it off. Staffs and vehicles should place themselves within the protected area thus formed.

The threatened units turn in the appropriate direction, properly utilizing cover and obstacles while so doing, and, when necessary, fix baxonets. Only such a part of the force is designated to fire as seems necessary for warding off the attack; the other parts continue to carry out the task assigned them. The commander retains a part of his force in readiness for warding off unexpected attacks.

"When exposed to hostile fire while warding off a cavalry charge, the men should assume the position offering the smallest target.

"If a platoon is *directly attacked* by cavalry, it will only in rare cases be advisable to open fire at ranges beyond 600 paces (450 m.); *frequently it will be a good plan, however, to let the cavalry come up close.* When the platoon participates in warding off a cavalry attack made against another unit, it may open fire at longer ranges.

"Fire at will is the principal kind of fire to be used in warding off cavalry."

France. Infantry, no matter in what formation it may happen to be, has nothing to fear from hostile cavalry, even if the latter is in superior numbers, provided the infantry remains cool, well in hand, and makes good use of its fire.

When cavalry surprises infantry, the effect is as great as of old. Infantry should therefore carefully protect itself in all situations of combat, especially during critical moments.

If cavalry is reported, infantry can guard against all contingencies by echeloning. It should not allow itself to be diverted from its task so long as the cavalry does not begin an attack.

Any disposition that enables infantry to change front quickly to meet a charge, and to deliver a strong fire, is calculated to stop even the boldest cavalry.

When fighting dismounted cavalry, it is considered desirable for the infantry to advance quickly to medium and short ranges for the purpose of firing upon the cavalry as it mounts.

Russia. Nothing prescribed.

Japan. Infantry which, while engaged with the enemy, is forced to discontinue its movement or to change its formation for the purpose of warding off hostile cavalry, has already suffered a partial defeat. Only those fractions that are absolutely necessary for repulsing the cavalry should take up the fight against it.

VIII. INFANTRY VERSUS ARTILLERY.

1. THE PASSAGE OF INFANTRY THROUGH ARTILLERY LINES.

The artillery of a mobilized German army corps with its twenty-four batteries takes up approximately 2500 m. of the front of about 4000 m. available for the corps. When the ground is unfavorable, the front available for the other arms may be still further reduced. All remedies suggested for reducing the frontage required by artillery offer no real solution of the difficulty; in fact, they have resulting drawbacks, such as the reduction to ten paces of the interval between guns, and the posting of artillery in two lines, one in rear of the other. On account of these drawbacks, a commander will avail himself of these remedies only in case of the most urgent necessity. The question as to how infantry can best pass through these long artillery lines is therefore of especial interest. While artillery will generally seek commanding positions and avoid covered terrain, infantry will make use of depressions and cover as the natural routes of advance for passing by batteries in action and for deploying subsequently in front of them. In this case the solution of the problem is simple. The difficulties are disproportionately greater when terrain impassable for artillery is lacking. Nothing could be more desirable for hostile artillery which has adjusted its fire upon our batteries, than for the intervals between our guns to become suddenly filled with infantry, whereupon our artillery, until now under fire, would have to cease firing so as not to endanger our infantry. This pause in the fire will be more noticeable, when our artillery has not yet succeeded in gaining a superiority of fire over the hostile guns; and its length will depend upon the

depth of the infantry formation. In this case the infantry cannot avoid heavy losses as it must cross the fire-swept space in rear of the guns, and soon thereafter must enter the zone of the opponent's actual "fire for effect," besides losing for the time being the support of its own artillery fire. It is obvious that for infantry to advance in deployed lines through artillery in action, condemns the latter to long silence, and even exposes it to the danger of being placed altogether out of action. Infantry can pass through artillery lines at certain points only, its passage being subject to an agreement between the infantry and artillery commanders. It is advisable to have those batteries cease firing whose fire has the least influence on the course of the artillery combat. It is, however, of the utmost importance that the fire of all hostile batteries which possibly could fire on our infantry, be kept down by the increased fire of our artillery. In this manner, we may perhaps be able to draw the fire of the hostile artillery away from those points at which our infantry is to pass through our artillery line. This is especially important. It will also be advantageous to designate successively, different points in the artillery line for the passage of infantry. This should be done for two reasons: first, in order that a favorable target whose re-appearance the hostile batteries could await with loaded guns, may not be presented to the enemy at one point for a prolonged period; second, in order that movements by the flank on the part of the infantry may be obviated. The column of squads would be a suitable formation in which two battalions of infantry could simultaneously pass through the line of guns approximately within the space occupied by one battery. These battalions should then at once deploy, executing front into line toward their respective outer flanks. The guns can resume firing only when their infantry has reached a point 3—400 m. in front of them. The artillery will be able to resume its fire earlier when it is posted in rear of a crest, and for this reason such points should be selected for the passage of infantry.

2. THE ADVANCE UNDER ARTILLERY FIRE.*

In almost every attack, infantry will be obliged to advance for considerable distances under artillery fire without being able to take advantage of cover. It should guard against being surprised by artillery fire while in an unsuitable formation.

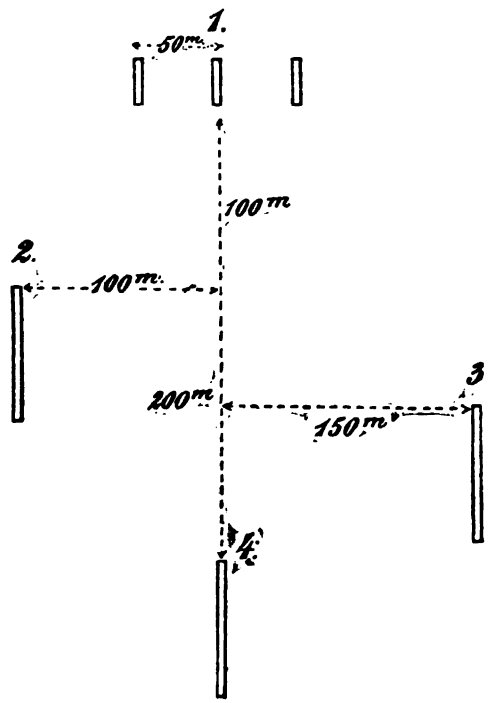
In the first place, everything that facilitates the enemy's adjustment and observation of fire should be avoided. (See p. 119 supra). To this end, infantry should not remain unnecessarily long near objects that are clearly visible at a great distance. If it is noticed that the enemy is beginning to adjust his fire on some prominent feature of the terrain, that point should be passed as quickly as possible; the same is true of a plain in the enemy's zone of fire. Narrow columns, separated by intervals of 50 m., their heads not on the same line, are advantageous. This formation prevents shrapnel from simultaneously striking two columns, and makes it difficult for the enemy to judge the relative position of the smoke from the burst of his shrapnel with respect to the target. This increases the difficulties of the enemy's observation of fire, as it is not easy for him to determine whether his shots go over or fall short. A shallow echelon formation (about 50 m. deep, as used in Russia, for example) is valueless for reducing losses, owing to the depth of the beaten zone of modern projectiles.

The narrowest possible front should be presented to the enemy when within his zone of fire.

It is, moreover, desirable to make the further observation of fire difficult for the hostile artillery, and to diminish the effect of his projectiles at the target (see p. 120 supra) by taking up suitable formations. Broad, shallow formations were suitable against the shell fire of the past. However, they had the great drawback of considerably facilitating the observation of shots falling short or going over, as the smoke

*A lecture delivered by Major C. E. D. BUDWORTH, R.A., at the Royal Artillery Institution, on December 3, 1908, entitled, *Infantry Formations in the Attack; from an Artilleryman's Point of View*, contains some interesting information. The lecture mentioned appeared in *The Journal of the Royal Artillery* for February, 1909. *Translator.*

from the burst hid the target in the first case, and as the target appeared silhouetted against the smoke from the burst in the second. The cone of dispersion of the modern base charge shrapnel combines comparatively small lateral spread with great effect in depth. The effect of a well-placed shrapnel may be confined to one target, and that of projectiles bursting in the intervals reduced by taking up a formation in which narrow columns (columns of squads) are separated by wide intervals (up to 50 m.).



The range is determined or verified by bracketing; that is, by enclosing the target between shots which, fired at a known difference of range, strike respectively, short of and beyond the target. In France this is done either by battery salvo or by piece. In the former case, the French distribute the fire equally over the entire space which they wish to cover with fire; hence, they do not direct it upon the individual columns,

especially when they employ indirect laying, their favorite mode of procedure. It is in this kind of fire especially that narrow columns, separated by wide intervals, are a great advantage, because it is pure accident if a projectile falls so that its burst can be observed. Moreover, when the columns are not abreast of each other, the observations of bursts may be contradictory. Thus, in one salvo, "over" and "short" bursts may be obtained, especially if several bursts could not be reliably observed, and the salvo will have to be repeated. When a projectile bursts "short," immediately in front of the 1st company, for example, it may be assumed that the next projectile will be fired at a range increased by 100—200 m. The 1st company should therefore move to the front at double time, the 2nd and 3rd likewise, while the 4th executes platoons front into line and takes to cover in anticipation of an "over" shot. The "over" meant for the 1st company will then be the signal for the 4th company to rush forward. *The following general rule may be given: A projectile bursting "over," or just "short" of the target requires that the force fired upon move quickly; a projectile bursting far "short" of the target requires that cover be taken.* The platoon and squad leaders of the attacking force should not betray its presence by standing upright; the force should disappear absolutely without leaving a trace.

A force cannot, in the long run, prevent artillery from effecting an adjustment of fire upon it; all it can do is to postpone the beginning of the fire for effect.

Fire for effect is of three kinds:

1. "Progressive fire" (*tir progressif*). In this fire, after establishing a bracket (as a rule, one of 200 m.), every piece fires two rounds at each of four ranges, viz., at a range 100m. less than the short limit of the bracket, at both ranges of the bracket, and at a range 100 m. greater than the long limit of the bracket. For example, if a bracket has been established for

the target at 3000 and 3200 m., the battery would fire at 2900, 3000, 3200, and 3300 m.

2. "Sweeping" (*fauchage*) is employed when it is desired to cover a broader zone. In this every gun fires three rounds at each of the ranges designated. The first round is fired with the line of sight directed on the right portion of the target (or on the aiming point). Before firing each of the succeeding rounds, the direction of the piece is changed to the left by three turns of the traversing handwheel. At the next range this process is reversed, the direction of the piece being changed to the right by three turns of the traversing handwheel after each round. At 2500 m., for example, a battery can cover, in this manner, a space twice the width of its own front.

3. "Fire at successive ranges" (searching fire). In this fire salvos or volleys are delivered at the target at a number of ranges to be designated by the battery commander.*

During the Russo-Japanese war, all close order formations proved unsuitable under artillery fire, except when the terrain afforded cover. The Japanese infantry recognized very soon that the best protection against artillery fire lay in constant motion (irregular rushes made by small units) and in wide extension. The following procedure, employed at Yoshirei on July 31st, 1904, seems worthy of imitation:† The several platoons of the companies followed each other in deployed lines at distances of 200—300 m. When they had to cross open ground in order to reach a designated line, the platoons sought to advance by squads, whose men were deployed at intervals of 5—10 paces and who moved at a rapid gait inter-

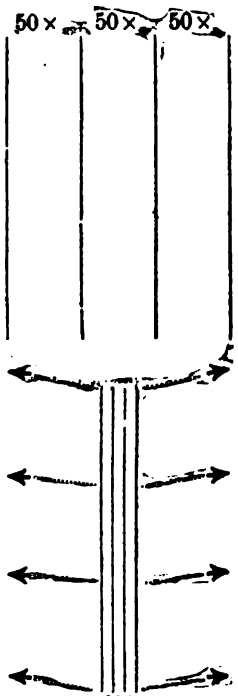
*The Belgian Drill Regulations (1907) give the following details in regard to the fire effect of a French four gun battery: In "progressive fire" (*tir progressif*), 32 rounds cover a space 100 m. wide and 400 m. deep (1 fragment covers 6 sq. m.). When direct laying is employed, one fragment covers 2 sq. m. In "progressive fire with sweeping" (*tir progressif avec fauchage*), 48 shrapnel cover a space 200 m. wide and 400 m. deep, each fragment covering 8 sq. m. Depending upon the range, 1½ to 5 minutes are required to secure adjustment. (See p. 119 supra).

†SIR IAN HAMILTON, *A Staff Officer's Scrap Book*, I, p. 337.

Formations used by Infantry during the Russo-Japanese War when under Artillery Fire.

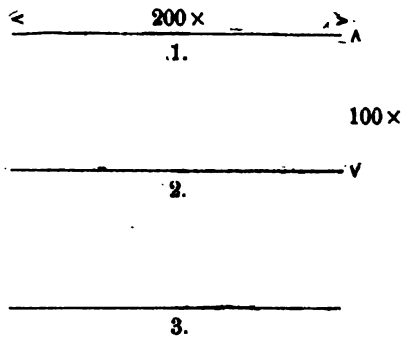
a.

A platoon in route column forms four columns of files.



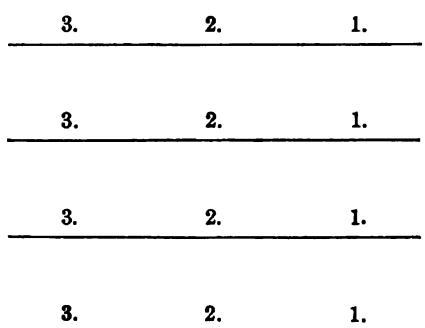
b.

A company in column of platoons, each in line of skirmishers with the men 2—4 m. apart.
(It would be better to use sections instead of platoons).



c.

The ranks of the sections in each platoon of the company following each other at a distance of 100 m.
This formation was taken up from company column (German).



rupted by breathing spells. The men invariably assembled when cover was reached. The losses were insignificant. The Russians also made use of a similar procedure after their first disastrous experiences. In many instances the platoons ran forward in single rank. "Change of gait and direction, as well as the use of loose irregular skirmish lines make it difficult for the artillery to hit anything." (Par. 450 German I. D. R.).

These formations made it possible to advance at a walk to within 3000 m. of a hostile position; beyond that an advance by rushes had to be resorted to, in which the attacking force avoided showing itself simultaneously in long lines. The simplest scheme might be to move forward in column of sections, each section in skirmish line. Formation "a" is well adapted for quickly crossing fire swept places, and when there is hope of re-forming the column subsequently. Formation "c" is suitable for quickly deploying from company column. However, the last-named formation no longer guarantees a proper leading of the company, and quite naturally does not absolutely prevent losses. After the Japanese 5th Brigade (Nambu) had taken possession of Yuhuntun* and the three houses during the night of March 6/7, 1905, the following dispositions for attack were made by the Russians about noon on the 7th: On the right, the 5th and 10th Rifle Regiments, in five lines, each consisting of one battalion (total depth of the formation 600 m.); in the center, the 123rd Infantry (Koslov) of which the companies of three battalions were deployed in single rank lines, each consisting of one company, with the men at intervals of from 3 to 5 paces, the companies in rear of each other at distances of 100 paces; the IVth Battalion, similarly formed, was posted in echelon to the left rear. The 124th

*v. TETTAU, *Achtzehn Monate mit Russlands Heeren in der Mandschurei*, II, p. 334.

SPAITS, *Mit Kasaken*, p. 310.

Col. CSICSERICS v. BACSANY, *Unser neues Feldgeschütz*, 1907, pp. 17 and 21.

Infantry advanced on the left flank. The Koslov Regiment, advancing without hesitation in quick time and at attention, was fired on by three Japanese batteries while it was moving from 4000 to 2000 m. The regiment lost about 600 men. This loss is insignificant when the size of the target (about 600 m. wide and 1000 m. deep) is considered. The Japanese did not care to become involved in a serious infantry action and therefore evacuated the place. It would have been better to advance by rushes with smaller units, as the terrain afforded no cover whatever. Whenever the Japanese had sufficient time, they crossed such plains singly, one by one, and then assembled under cover for the attack.

3. FIRING ON ARTILLERY IN POSITION

was in the past a pet fire problem. The effect of frontal fire on artillery whose guns are protected by shields is so small that the expenditure of ammunition is not justifiable.* The gap between the steel shields of the French field gun is not large enough to exert a noticeable influence. Steel shields, 3 mm. thick, afford protection against steel jacketed bullets fired at or beyond 300 m.; against "S" and "D" projectiles they afford protection, it is said, beyond 500 m. only. Machine guns directing continuous fire on a point may obtain better results. According to firing tests 3 mm. armor plate can be pierced up to 1000 m. only by special projectiles (solid steel projectiles and those having a steel core), the adoption of which is precluded on practical grounds (variations in sectional density, and difficulty of manufacture).† For this reason, it is better to leave the task of destroying shielded batteries, even when they are in the open, to one's own artillery, than to at-

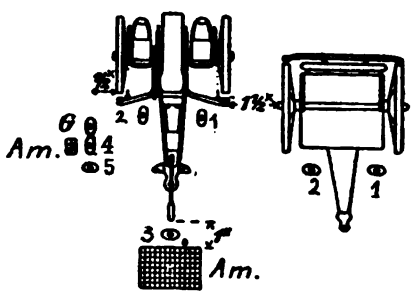
*Even prior to the adoption of shields it was demonstrated that infantry was unable to destroy the matériel of batteries so as to render them immobile; it could only interfere with the *personnel*, but could not demolish the batteries.

†*Mitteilungen über Gegenstände des Artillerie und Geniewesens*, 1907, No. 5.

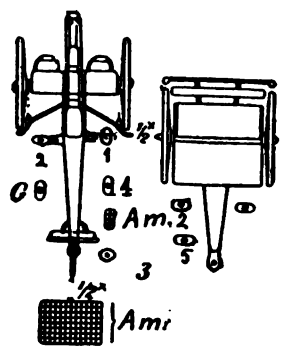
tack them with infantry. The fire effect of the infantry is not noticeably increased when delivered obliquely against the front of the battery. (Par. 184 German I. D. R.). In Germany the gun commander and cannoneer No. 3, who is posted at the trail, are then especially endangered; but in order to flank the guns effectively and to reach in rear of the shields with its fire, the infantry must move to a flank a distance at

Germany.

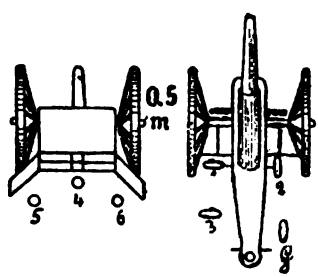
Field Howitzer.



Field Gun.



France.



least equal to 1/3 of the range, and even then the fire effect is very small. The effect may even be entirely nullified when the flanking fire is delivered from the side on which the caisson bodies are posted. In this case it suffices to push forward the caisson body to protect the personnel. It is a good plan

for infantry to direct its fire on the limbers and the reserve. And again, infantry should not let any opportunity pass to fire on artillery in motion or in the act of limbering or unlimbering within effective range. Guns moved by hand into positions from which direct laying can be employed for the purpose of warding off the infantry attack, offer particularly favorable targets. Infantry that is to capture artillery must approach its objective by means of irregular rushes made by small groups, and increase its fire to the utmost intensity when the limbers are brought up to the guns. The effect of artillery fire is small under 200 m., in the absence of canister.*

The disaster which overtook Trautmann's Battery at St. Hubert, during the battle of Gravelotte, demonstrates how difficult it is to unlimber on open ground when under effective infantry and artillery fire; but, if five limbers with their teams had not stampeded, perhaps it might have been possible after a while, for the battery to reopen fire. Hasse's Battery, also at St. Hubert, was rendered incapable of moving in a short time, but, in spite of the greatest difficulties, managed to continue its fire for about two hours, though with only a part of the guns. Gnügge's Battery managed to unlimber under cover of a garden wall at St. Hubert and to maintain itself there under enfilading infantry fire till the end of the battle. Trautmann's Battery lost 17 men and 37 horses; Hasse's Battery, 38 men and 77 horses; and Gnügge's Battery, 15 men and 40 horses.†

Unlimbering under uninterrupted hostile fire at short range will always produce conditions similar to those in Trautmann's Battery, and in the two British batteries of Colonel Long at Colenso.‡ These two batteries did not cease firing because they had suffered too heavily, but only because they had expended all their limber ammunition and the caissons were un-

*The capture of the Smolenski Artillery Battalion on October 14th, 1904 (Shaho). *Artilleristische Monatshefte* for March, 1908.

†HOFFBAUER, *Deutsche Artillerie*, III, p. 227.

‡*Kriegsgeschichtliche Einzelschriften*, 32, p. 43.

able to come up. It was impossible for these batteries to limber up under the hostile fire. It was likewise impossible to destroy a battery, though without protecting shields, even when great quantities of ammunition were expended.

At the battle of Beaumont, the artillery of the 7th Infantry Division suffered heavy losses. "Although the first caisson sections were up and the men with them were detailed to assist in working the guns, the gun squads in both batteries had dwindled down to 2 or 3 men each by 1 P. M., *i. e.*, within half an hour." Immediately after the French attack had been repulsed, one of these batteries was able to accompany the advancing infantry, however, while the other (the 4th Light Battery) could not move its guns until an hour later, as it had lost 29 men and 34 horses.* This example proves again that when artillery has once managed to go into position and to open fire, it cannot be annihilated by infantry alone, and therefore need not fear to take up a more than temporary position in the first line.

The best way for artillery to protect itself against annoyance from hostile infantry fire is to push forward an infantry screen, even if only a weak one. In the days when batteries had no shields, this screen enabled artillery to devote its entire attention to the principal target without regard to hostile infantry. At the present time, especially in positions in rear of a crest and in long artillery lines, the principal object of such a screen is to prevent hostile patrols from molesting the artillery. Small detachments posted at wide intervals are sufficient for this purpose. The flanks and rear are now as in the past the vulnerable points and are most exposed to daring, sudden attacks, even if only made by weak hostile detachments. (Par. 448 German I. D. R.).

At the battle of **Vionville,**† about 5 P. M., four horse and seven field batteries of the IIIrd Army Corps were engaged near **Flavigny** with ten

*HOFFBAUER, *Deutsche Artillerie*, 8, pp. 44 and 210.
HOPFFGARTEN-HEIDLER, *Beaumont*, p. 40.
†*Gen St. W.*, I, p. 557.

French batteries. After this artillery duel had lasted half an hour, French Guard Infantry advanced to the attack. This was repulsed by artillery fire at a range of 800 m., but the fire of the artillery was diverted from its proper objective by the advance of this infantry. Similarly, at **St. Privat,** two batteries of the Guard Artillery had to direct their fire on French skirmishers.

IX. THE ATTACK.

The defense may repulse the enemy, but only the attack can annihilate him. The decision as to whether the force is to attack or stand on the defensive depends upon the tactical situation and the will of the commander, and not upon numerical superiority, of which one is not aware, as a rule, until after the battle.* Determined attacks, again and again repeated, in spite of all failures, are the surest means of gaining victory and of preventing the enemy from becoming aware of his superiority. Only pressing reasons (marked hostile superiority, necessity for awaiting approaching reinforcements, or the failure of an attack), and never favorable terrain conditions, should determine a commander to stand on the defensive. In defense the eventual assumption of the offensive is kept constantly in view. A commander who voluntarily stands on the defensive for the purpose of letting the opponent attack, and then attacks him in turn, reaps only the disadvantages and never the advantages of both the offensive and the defensive.

The attack may take various forms, depending upon whether the dispositions have to be made under hostile fire (surprise and rencontre), or whether the enemy has renounced the initiative and awaits the attack in a deployed formation, or in a position prepared for defense (deliberately planned attack). In the last case the attack requires more careful preparation and in many instances even necessitates the employment of special auxiliaries (such as guns capable of high angle fire, and engineer trains). However, the advance of a strong firing line to within assaulting distance of the enemy, and the uninterrupted fight for the superiority of fire, are common to all attacks.

*See *Taktik*, V, p. 121, et seq.

Aside from the attack against an enemy in position and the rencontre there is an attack formation more closely resembling the rencontre in character, which may be called the *abridged attack.** This attack formation is used in forestalling the enemy in occupying important points, in preventing enveloping movements, in carrying out flank attacks, in surprising the enemy, in warding off a hostile surprise, in relieving the pressure on a neighboring force, etc. It is moreover appropriate where the conformation of the ground or the time of day prohibit a use of the rifle.

The first stages of the fight of the 6th Infantry Division at **Vionville** are of this character. The fire fight was relegated to the background in view of the constant movement to the front. The situation prohibited our properly taking advantage of our superior marksmanship.—The attack on the railroad cut of **Nuits,** during the late afternoon of December 18th, 1870, progressed similarly.†

1. THE SURPRISE.‡

Insufficient reconnaissance may place a force in a situation where it will be obliged to go into action directly from route column or from a formation unsuitable for combat, against an enemy who unexpectedly opens a lively fire at short range, thus increasing the moral effect of the surprise by actually inflicting losses. The force which is taken by surprise will without doubt overrate the seriousness of the situation and will be inclined to overestimate the strength and morale of the opposing force. This must be taken into account in coming to a decision.

Above all else, it is important to develop, as promptly as possible, a fire effect at least equivalent to that of the enemy, to let the troops regain confidence, and to secure the initiative. A bold decision is best calculated to extricate a force from such

*Abgekürzter Angriff.

†KUNZ, *Gefecht von Nuits,* p. 19, et seq.

‡See *Taktik,* V, p. 190.

a critical situation.* It is of little use to deploy, take cover, and open fire, when the enemy is well concealed; a decision to retire is still less to be approved, because at short ranges it is bound to lead to a complete annihilation of the force. As a rule, a defeat can only be averted, in such a case, by assuming the offensive and thus repulsing the enemy. The decision for attacking directly from route column (or, when the enemy is still at a distance, at least for deploying toward the front) is the more justifiable, since an enemy who prepares an ambuscade for us is, as a rule, conscious of his inferiority in numbers, morale, and training, and resorts to deceit because he does not dare to meet us in the open. Therefore, overwhelm the enemy with fire and then charge him with the bayonet. An impetuous advance may perhaps intimidate him, and our losses will be less, at any rate, than if we turn our backs on him and await our fate in what is at best but a poor position, as it is taken up, as a rule, during the first moment of panic. However, even if a force that is taken by surprise cannot avert disaster by making a determined counter-attack, it can at least save its honor and morale. This is equally true of the rencontre on the battlefield.

Examples of Surprises.

The surprise at **Baalon** on September 17th, 1870.† The surprise at **Vouziers** on December 15th, 1870.‡ The conduct of the French infantry when surprised in its camp at **Beaumont.**

During the battle of **Noisseville** there occurred an unusually instructive episode, the disastrous results of which could have been easily avoided if the mounted officers on duty with the force had been sent out to reconnoiter. Six companies of the 44th Infantry (Prussian) were advancing

*"No matter how unexpectedly the enemy may appear, you should never forget that he may be annihilated either with the bayonet or with fire. The choice between the two is not a difficult one, and the formation to be adopted is of secondary importance. When the enemy is at close quarters, always use the bayonet; if he is still at a distance, fire on him, and then use the bayonet." DRAGOMIROV.

†CARDINAL VON WIDDERN, *Krieg an den rückwärtigen Verbindungen*, I, p. 149.

‡ Ibid., II, p. 125.

from **Flanville** against **Montoy.** On the French side, the 62nd Infantry was likewise advancing against Flanville and had arrived at Montoy when the 44th Infantry (Prussian) very unexpectedly appeared on its left flank. The French regimental commander decided to attack at once. "The Prussian detachments advancing south of Montoy were about to scale the west slope of the ravine near there, when, at very short range, they suddenly encountered the rapid fire of a dense French skirmish line, which was immediately followed by the counter-attack, consisting of columns in close order. At the same moment, the left flank of the Prussians was attacked from the south, and other hostile columns advanced from the park through the west entrance of the village. The Prussian skirmish lines were repulsed in an instant, and thrown into complete confusion. The hostile fire had an annihilating effect on account of the short range, and the situation was at once completely reversed. The Prussians sought in vain to gain a firm foothold in the eastern outskirts of the village of Montoy. Their losses were heavy. The four companies (3rd, 9th, 11th and 12th) of the 44th Infantry numbered in all 18 officers and 840 men; they lost 7 officers and 480 men, of which number 1 officer and 82 men (all unharmed) were taken prisoners. The 9th Company suffered least; but the 3rd, 11th and 12th Companies (44th Infantry) lost in all 55.5% of their effective strength, the 3rd Company even losing 67%."*

This surprise could without doubt have been avoided. If the 44th Infantry had sent mounted men ahead, it would have been in a position to let the French walk into its fire. Soon after this occurrence, the French infantry also unexpectedly received flanking fire from Flanville, which forced it to abandon the pursuit after suffering some losses.

When two forces unexpectedly collide in close country, the advantage rests decidedly with the one that opens fire and advances to the charge first. This onslaught with cold steel should become second nature to the troops. In traversing close country, a force should be in a formation that enables it to develop an adequate fire and to make a charge in compact formation. A line formation is entirely unsuitable, as a rule, on account of the difficulties of the terrain to be overcome, and in a skirmish line the officers cannot properly control the men.

For passing through thinly scattered timber without underbrush,† company column is a suitable formation, and for dense woods platoons advancing either abreast or echeloned, each platoon in line of squads in columns of files. If the platoons

*KUNZ, *Noisseville*, p. 32, et seq.

†See *Taktik*, VI, p. 117, et seq.

or sections were to advance in single file, the columns would be too long, and it would be next to impossible to maintain the intervals. The six or eight small columns of files of a platoon are, on the other hand, close enough together to keep each other in view; besides, they are easily and quickly deployed for firing and charging, and can meander through the woods more readily than an organization in close order. Moreover, the leaders can exercise better control over the men than in skirmish line, which invariably bunches up at the places that are most easily passed, while connection is not maintained at all at other points and march direction and cohesion is lost. (See the passage of the Bois de Givodeau during the battle of Beaumont).*

2. THE RENCONTRE.†

(Pars. 315—317 and 352—361 German I. D. R.).

"Uncertainty and haziness of the situation are the rule in war. During marches in campaign the opponents will frequently not gain detailed information of each other until they come into actual contact. Thus the rencontre develops out of a collision of route columns." (Par. 352 German I. D. R.).

Both forces are marching toward each other, and the collision occurs frequently at a point not intended by either; as every minute brings the heads of the two columns closer together no time is to be lost. The commander who desires to wait until he can come to a decision consonant with the results of the reconnaissance will arrive too late. The tactical situation in its entirety determines whether or not an attack should

*See *Taktik*, VI, p. 125, with sketch. HOPFFGARTEN-HEIDLER, *Beaumont*, p. 112, et seq.

Examples: The conduct of the infantry of the IXth Army Corps in passing through the Niederwald of Wörth, may serve as a model. KUNZ, *Kriegsgeschichtliche Beispiele*, 13, p. 108, et seq.

Engagement of La Landrière on January 11th, 1871. *Geschichte des Regiments Nr.* 20, p. 292.

Wald und Ortsgefecht, p. 109.

†See also *Taktik*, V, p. 192, et seq.

be made. If we do not take advantage of the fleeting moment the enemy will surely do so, and, as a rule, he will not be any better prepared for action than we are. Frequently the deployment from route column is not made because the commander desires it, but because it is necessary in order to avert a crisis in the leading line. The commander who is acting under hostile pressure should endeavor to regain the upper hand as quickly as possible so that he can dispose of the troops of the main body with a definite object in view. In a rencontre, the advantage rests almost invariably with the commander who quickly sizes up the situation, attacks promptly, and succeeds in throwing the opponent on the defensive. A bold, impetuous attack, which would lead to disaster in the presence of an opponent already deployed, may, in this case, be productive of victory. The direction in which the attack is made is of less importance than a prompt decision on the part of the commander and the simultaneous launching of the whole force in a definite direction. We must take the terrain as we find it. In covered terrain, the effect of the surprise will be increased still more, while in open country, the preparatory stage of the combat will soon lose that character, because the side which has an advantage as regards terrain will make use of it, and the conviction will force itself upon the opponent that victory cannot be gained by an impetuous attack alone. It will be easy for a commander to come to a decision as to the action to be taken if he is conscious of his own strength or fears that the enemy desires to avoid an attack. (The commanders of the advanced troops of the IIIrd Army Corps at Vionville). *The rencontre increases the difficulties of troop leading, but makes the attack easier for the troops.*

The difference between a deliberately planned attack and a rencontre is most clearly apparent in the conduct of the advance guard. Its task is to secure the prospective artillery

position and to create favorable conditions for the combat of the main body. This requires that ground be gained to the front so as to enable the main body to deploy while moving forward. In addition, the advance guard should seize and hold important points, without, however, anticipating the intentions of the commander of the whole force. It is moreover desirable for the advance guard to interfere with the hostile deployment. Points lying on the flanks or in advance of the artillery position, especially if they command the latter, should be quickly seized; when necessary, the advance guard must fight for their possession. Its commander should quickly pick out the points that are important for this purpose; he should, by no means, be satisfied always to begin the fight where the point of the advance guard happens to be. Under certain circumstances the main body will have to concentrate for action farther to the rear so as to hasten the deployment and to take advantage of favorable terrain. When the enemy has an undeniable start in deployment, the commander may decide to let the opponent advance to the attack, and then bring about the decision by simultaneously launching his main body. Only thus can one in the long run avoid fighting superior numbers with an inferior force. (Par. 360 German I. D. R.). It is much easier to decide whether this or that point is of importance, than to answer the question as to whether the strength of the advance guard will suffice for the task of taking it. The reports of the cavalry in regard to the enemy's strength and the composition and formation of his columns, will scarcely furnish an adequate basis for a pertinent answer to this question. Moreover, one will usually not be able to tell, until after the action has commenced, how far the hostile deployment has progressed. But, in any case, long hostile firing lines demand caution. However, a start in deployment is not indicated by the combat frontage alone. A factor of far greater importance is which force has been most successful in making preparations for going into action by developing its main body and by having artillery near at hand. It is artillery that clears up the situation. When an infantry division encounters a

hostile force deployed on a front of 400—600 m., this does not necessarily mean that the entire division must systematically concentrate for action, as this would cause a considerable loss of time, thus giving the enemy a great advantage. *The general situation and the mission of a force are of greater importance for the commander's decision, than the state of readiness for action of the opposing forces.*

Issue of orders. See *Taktik,* V, p. 197.

The advance guard must be promptly informed of the intentions of the commander (*i.e.,* whether he intends to attack, to concentrate for attack farther to the rear, or to let the enemy attack*) and of the location of the prospective artillery position. The attack order should be withheld until the combat of the advance guard has sufficiently cleared the situation, but a development of the force should be ordered at once.

The advanced detachments should endeavor to gain a start in deployment over the enemy and cover the advancing artillery in front and flank, by quickly deploying strong firing lines and pushing machine guns to the front. After they have done this, they should promptly advance to the attack. Through this, our firing line, while in the act of deploying, runs the serious risk of suddenly encountering, at short range, the fire of superior hostile troops, at a time when all the troops approaching the field are still too far distant to increase its fire power† Whether the quickly formed firing lines should at once move forward to the attack in a rencontre, depends upon the impressions received by the commander. His dispositions should be such as to compel the enemy to disclose his available forces at an early moment. Every fighting line is so sensitive to fire simultaneously delivered against its front and flank, that an attempt to turn the hostile position will instantly force the enemy to take counter-measures. If the enemy is unable to keep pace with us in deploying a firing line, if he is unable to deploy skirmish lines as dense as ours, this state of affairs

*Par. 350 German I. D. R.

†This induces the British *Infantry Training* to prescribe that in a rencontre a concentration for attack should invariably be ordered.

should induce our commander to proceed to the attack; if the reverse state of affairs exists, he should await the arrival of reinforcements. But in order to obtain this insight into the existing situation the troops must get close to the enemy. Such an insight into the hostile dispositions cannot be gained at long range. The extent of a hostile position may perhaps be determined at long range with the best field glasses, but the strength and power of resistance of the enemy can never be gauged in this manner. If one threatens to push an attack home, however, the enemy will be compelled to show his hand. When opposed by an enemy whose strength is unknown, it will unquestionably be necessary to approach to the extreme limit of short ranges. From here the dispositions of the enemy may be clearly recognized, and, in addition, at 600—800 m., a firing line that has made a lodgment in some feature of the terrain will not as yet be exposed to annihilating losses. Misconceptions are scarcely to be avoided in such a situation. One must trust to luck and take some risks. On the other hand, the training of the infantry should afford the assurance that it will not give up the position it has once reached; it should firmly hold the ground gained, and persevere.*

When infantry is compelled to go into action, the necessity of occupying important supporting points and of gaining ground for the concentration for action, requires a broad front to be covered. (Par. 357 German I. D. R.). The artillery, which will arrive soon thereafter, will then bring relief to the infantry in critical situations.

In every rencontre there comes a moment when the fight is at a standstill. At this moment an attentive observer may notice that, although it is impossible to push the attack home without further reinforcements, the space in which the concentration for action is to take place, is secured against a

*Military history furnishes a multitude of examples of the fact that a force can persevere in spite of the most galling fire (St. Privat. Gorni Dubniac). A reverse does not occur, as a rule, until the advent of unforeseen circumstances. The Brigade of Highlanders held out for hours at Magersfontain, and an insignificant change of front on the right flank subsequently caused the whole line to retire. See *Kriegsgeschichtliche Einzelschriften*, 32, p. 74.

hostile attack, or that the enemy has been deprived of the initiative and has been thrown on the defensive. This is the moment in which the commander regains the initiative and in which, by means of an *attack order,* he can dispose of the troops of the main body as he sees fit. *The "rencontre" differs from the "deliberately planned attack," in that, in the latter, the concentration for action can proceed smoothly as desired by the commander, while in a rencontre the opponent, for the time being, dictates the course of action. Therefore the commander should make efforts to free himself from this restraint, i.e., he should endeavor to launch his troops in a manner not influenced by the dispositions of the enemy.*

The degree of control which a commander retains over the course of the combat depends upon the promptness with which he gains a general idea of the situation. For this, if for no other reason, he should be as near the head of the column as possible while on the march. The troops sent first into action, supported by the artillery, must put every available man into the fight, in order to repulse attacks made by the enemy and to enable the commander to launch the main body as an entity. In any case, the battalions of the main body should not be successively thrown into the fight as soon as they arrive, for the purpose of overcoming a temporary crisis, or for relieving the advance guard from a dilemma. The machine gun batteries, whose employment was particularly important during the preparatory stage of the fight, should be withdrawn as early as possible so as to be available as a reserve in the hands of the commander.

In bringing the main body into action, deployments by the flank should be avoided. The deployment should be initiated by subordinate units (in an infantry division, by regiments) moving out of the route column and toward the objective points determined by the purpose of the combat.*

*General VON SCHLICHTING holds a different view in his work *Taktische und strategische Grundsätze,* I, p. 106. "In a rencontre, the piece on the board of the battlefield can be moved only when the next one is clear of the march column and ready for action. Further action is then not only permissible but imperative."

Provisions of Various Regulations.

In all the regulations, those of Germany excepted, the rencontre is treated with marked reserve.

Austria. "When a collision occurs with an opponent who is likewise in the act of advancing—*rencontre*—the different parts of the force and their subdivisions must make strenuous efforts to advance in the designated direction. In a rencontre, it will be proper to concentrate the main forces, prior to making the attack, only in case it becomes apparent during the preparatory stage of the action that the enemy has gained a visible start in deployment. The endeavor to forestall the enemy, and the necessity of promptly reinforcing the troops already engaged, will often curtail or preclude the preparatory concentration of the main body in a rencontre, and force the commander to permit at least parts of his approaching troops to go directly into action." If conditions are eminently favorable for the enemy at the point where the collision occurs, it may sometimes be more desirable to stand provisionally on the defensive with the advance guard until other troops come up.

"Under such circumstances, it may even be advisable to withdraw the troops covering the march; but in that event, the relation of the force to neighboring columns should be considered."

France. The commander should decide promptly whether to attack, to stand on the defensive, or to avoid an engagement for the time being. The regulations do not provide for employing the troops directly from route column. The advance guard is frequently thrown on its own resources; it is often forced to fight on a very broad front, and to place all of its troops into action at the very beginning of an engagement for the purpose of seizing and holding supporting points necessary for the subsequent deployment.

Examples.

1. The deployment for action of the 5th Infantry Division from the defile of Gorze, against the French Division Vergé, at the battle of **Vionville** (16th August, 1870), is especially instructive.*

2. The engagement of the 2nd Bavarian Division at **La Thibaudine (Beaumont).** The French concentration for action had progressed farther than that of the Bavarians. The reconnaissance by the cavalry was insufficient.†

3. The fight of Mondel's Brigade at **Trautenau.**‡ Likewise the fight of the Vth Army Corps at **Nachod** on June 27th, 1866.

**Gen. St. W.*, I, p. 549. VON SCHERFF, *Kriegslehren*, II, p. 50. KUNZ, *Kriegsgeschichtliche Beispiele*, 8-9, p. 32, et seq. *Taktik*, V, p. 210.

†HOPFFGARTEN-HEIDLER, *Beaumont*, p. 90.

‡*Taktik*, V, p. 206. STROBL, *Trautenau*, p. 8, et seq. KÜHNE, *Kritische Wanderungen*, 8, p. 16.

X. THE ATTACK ON AN ENEMY DEPLOYED FOR DEFENSE.

1. LESSONS OF WAR.

During the **Boer War** (1899-1902), the British infantry always attacked positions prepared for defense. Aside from the superannuated fire tactics and deficient marksmanship training of the British, their failures in the early engagements of the war may generally be traced to the following causes:—

1. Insufficient reconnaissance. This caused British detachments to be surprised, in a number of cases, by fire at short range. (Brigade of the Guards at **Modder River**). In many instances, the British forces were even surprised by fire while in close order formations. (Hart's Brigade at **Colenso**).

2. Pure frontal attacks, in which equal forces were frequently pitted against each other. (**Modder River, Magersfontain, Colenso**).

3. Insufficient protection of the flanks by echelons against fire surprises carried out by small detachments.

4. Insufficient coöperation of the artillery and infantry.

5. Isolated attacks made by brigades (consisting of 4 battalions). The employment of several brigades simultaneously for concerted action was a rare exception.

6. Insufficient support of the firing line. A timely reinforcement of an organization that had already been shaken never did occur.

7. Hesitating use of reserves in the crisis of the fight. At **Magersfontain** only 8½ battalions out of 13, and at **Colenso** only 6 battalions out of 16½, had been seriously engaged. When **Spionskop** was evacuated, 11 battalions had not as yet been engaged. The attacks were begun, but not pushed home.

The Infantry Attack in the Russo-Japanese War.

The combat tactics of the Russian infantry* (Russian I. D. R. of 1903) were based on shock action, narrow frontage, and deep formations. The

*"The Russian infantry is embued with a mixture of defensive spirit and instinct for hand to hand fighting." COUNT MARENZI.

bayonet training preached by Dragomirov was the result of the belief in decisive psychological impressions and the consciousness that the Russian fire tactics, based upon volley fire, were inadequate to annihilate a well concealed defender. Thus, the endeavor to cross blades with the opponent as quickly as possible, led to a headlong rush to the front, without creating the preliminary conditions necessary for pushing the attack home. The hesitation of the higher commanders to throw in every available man at the decisive stage, and the tendency, reaching down to the lowest grades, of creating detachments and separate missions, contrasted unfavorably with this splendid offensive spirit.

The Japanese infantry was trained according to the letter and spirit of the German regulations of 1889. It had fought shy of unhealthy tendencies after the Boer war, cultivated the independence and initiative of all leaders, and recognized the necessity of night combats and of using the spade. In addition, the way for success was carefully, almost cautiously, prepared by the commander-in-chief, who left nothing to chance. It is easy for subordinate leaders to be bold and daring, when they know that the commander-in-chief has neglected nothing to ensure victory. The principal characteristics of the Japanese combats were—

1. The cautious advance, frequently under cover of darkness;

2. The systematic preparation of the attack by the coöperation of infantry and artillery, and the determined advance along the whole front;

3. The attempt to induce the enemy to launch infantry at a point where the decisive attack was not to take place;*

4. The sudden launching of the decisive attack;

5. The prompt preparation of every captured position for defense;

6. The absence of pursuit.

The fights at **Wafangu,**† as well as the attack made by the Guard and the 12th Division at the **Yalu**‡ proceeded entirely according to German pattern.

A change took place in the tactical methods of the Japanese when the Russian artillery—whose ballistic properties were superior to those of its antagonist—brought a greater number of guns into the field, and when, in addition, the Japanese infantry became numerically inferior in the battles after Liao Yang.¶

The task set commanders of armies and leaders of troops by the

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*The advance of the Vth Army at Mukden.

†*Einzelschriften über den Russisch-Japanischen Krieg*, Vienna, 1906, I, p. 226. The envelopment of the Russian right flank by the Japanese 19th Brigade is especially instructive.

‡*Ibid.*, I, p. 79, et seq. *Kriegsgeschichtliche Einzelschriften*, 39-40, p. 123, et seq. Consult also VON LÜTTWITZ, *Angriffsverfahren der Japaner*, p. 2.

¶The statements in regard to the strength of the opposing forces are still very contradictory. At Liao Yang 120,000 Japanese confronted 150,000 Russians; at Mukden the Russians had perhaps 10,000 rifles, 300 field guns, and 100 heavy pieces of ordnance more than the Japanese.

government, had to be met by a continuance of the offensive.* The peculiar character of the theater of war made it difficult to maneuver the enemy out of his strong positions; so at best nothing remained for the Japanese—unless they wished to renounce the offensive entirely—but to conquer the enemy by attacking him in front. Since the advantages of the attack—superior numbers and the freedom of choosing the point of attack—were thus dissipated, the victory had to be gained by making use of defensive expedients. As the demoralizing and retarding effect produced by fire increased more rapidly than the morale of the assailant, nothing remained but to intrench and to take advantage of the cover afforded by darkness as in fortress warfare. Moreover, the inferior forces available precluded deep formations and necessitated an immediate development of the entire force in one line. Thus the desire to push forward resolved itself into an advance along a broad front. Favored by the purely passive conduct of the Russians, this led to an envelopment of their flanks and a pressure on their line of retreat. The Japanese were able to overcome the constantly growing power of resistance of the Russian defense, because, while strictly adhering to the offensive, they availed themselves of defensive expedients although their movements were retarded thereby.

The conduct of the attack was, of course, considerably influenced by the character of the terrain. The Ist Army, fighting in hilly country, perhaps remained true longer to regulation formations and long rushes than the other Japanese forces, but was finally obliged to resort to a wide extension of closed bodies. The IInd and IVth Armies were differently situated, as the attack over open plains fell to their lot.

Speaking generally, the following details may be given in regard to the method of attack of the Ist Japanese Army:† Units were pushed into action abreast; objective points were assigned to each; and certain lines or points, according to which they had to maintain touch, were indicated to subordinate units. To avoid a surprise, if for no other reason, thin firing lines were formed at the outset, and in a serious attack whole companies, in dense firing lines capable of developing a strong fire, were at once thrown in; these advanced to mid ranges in order to open fire, as a rule, under 1000 m. The Ist army had a special *penchant* for making rushes of 80—100 m.,‡ usually by entire companies; the assault was, in many instances, begun as far as 300 m. from the hostile position, and then pushed home; supports and reserves followed in extended formation, but assembled promptly on reaching cover. The infantry was disinclined to

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*C. H. *Über das innere Wesen der japanischen und neuzeitlichen Offensive. Streffleur,* 1907, October number.

†*Streffleur,* 1907, January number.

‡This is not true of the 4th Guard Regiment. See VON LÜTTWITZ, *Angriffsverfahren der Japaner,* p. 24: Rushes of 50 m. were made "as the men otherwise got out of breath and shot badly." An advance was made by squads and crawling was tabooed. The new Japanese Drill Regulations warn against making rushes less than 30—40 m. long. On the other hand, according to the opinion of von Lüttwitz, the length of rushes will seldom exceed 100 m.

intrench during an advance, but never neglected to fortify quickly a captured position. In the combats of the Ist Army we will find the best lessons applicable to our conditions.

Examples.

1. The engagement of the Guard Division at **Yangtsuling** on July 31st, 1904.*

2. The attack made on October 11th, 1904, by the 15th Infantry Brigade (2nd Infantry Division) against **Temple Hill (Terrayama)**, which was held by 4—6 companies.†

Fire was opened at 900 m.; long rushes were used and firing line and supports were deployed; after a brief but violent fire action at 500 m., the hostile position was reached in a single rush and carried.

The artillery, to be sure, supported this attack with accelerated fire.

3. The attack made by the 4th Guard Regiment on October 12th, 1904, against a height south of **Huaku** (battle on the **Shaho**).‡

4. The attack made by the 3rd Brigade (2nd Infantry Division) under General Matsanuga, on October 12th, 1904 (long rushes), against the heights south of **Shotasko** (battle on the **Shaho**).

Outline Sketch of the Formation of the 3rd Brigade.

Frontage about 2000 m.

4. Infantry:			29. Infantry:
5. and 6.	4. and 2.	12. and 11. Cos.	10. and 2. Cos.
7. and 8.	1. and 3. Cos.		9. and 3. Cos

Brigade Reserve:

9. and 10. Cos.	11. and 12. Cos.
4. Infantry.	29. Infantry.

Troops in the act of coming up, but not employed:

1. and 4. Cos.	and	II. Bn.
29. Infantry.		29. Infantry.

First line: Eight companies (apparently entirely deployed). Interval between skirmishers 3 paces; between companies 40 paces.

The first halt (lasting seven minutes) was made at 1500 m. and the distance to 800 m. was then covered at a rapid run. The men that could not keep up, halted to recover their breath and then followed independently. At 800 m., the line opened a lively fire at will, which lasted for two

*GERTSCH, I, pp. 92 and 100 (Good maps). SIR IAN HAMILTON, *A Staff Officer's Scrap Book*, I, p. 313. *Urteile und Beobachtungen von Mitkämpfern*, I, p. 57.

†BRONSART V. SCHELLENDORFF, *Beim japanischen Feldheer*, p. 132.—VON LÜTTWITZ, *Angriffsverfahren der Japaner*, p. 23.

‡*Ibid.*, p. 24.

minutes, and then advanced by rushes by companies (first the right, then the left companies of the battalions). During this advance the supports (2 battalions) were absorbed by the firing line. At the same time the brigade reserve approached closer to the firing line (the original distance between reserve and firing line, before the advance began, was 300 m.). The last halt for firing was made at 250 m., from the enemy's position, and the latter was then carried in one rush. The losses amounted only to 235 men.*

In the IInd and IVth Armies, who fought, as a rule, on terrain devoid of cover, a far more cautious method of attack was produced. The distinguishing features of this mode of attack were thin firing lines (skirmishers at intervals of 5—10 paces) increasing only very gradually in density, and great frontage (a company 250, a battalion 800, and a brigade 2000—3000 m.).† This caused the attack to falter in many instances as soon as it had come within 400 m. of the hostile position, whereupon nothing remained but for the line to intrench and to work forward slowly from one position to another.

Examples.

1. The engagement of the 3rd Infantry Division on October 12th, 1904, at **Shiliho** (battle on the **Shaho**).‡

2. The engagement of the 5th Infantry Division, from March 6th to 9th, north of **Madiapu** (battle of **Mukden**). This division required three days to work forward from 1100 m. to within assaulting distance of the enemy's position. Cover for men standing upright was constructed at 1100, 950, 530, 390, 300, 200, 160 and 125 m., that under 300 m. being built of sand bags.¶

3. The combats of the 10th Division on March 3rd and 10th, 1904 (battle of **Mukden**).§

Confidential British instructions dealing with the tactical lessons of the **Russo-Japanese war**, make the following deductions: "* * * * The above shows the great importance of local reconnaissance by infantry, of which considerably more must be demanded than has been done up

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*VON LÜTTWITZ, *Angriffsverfahren der Japaner*, p. 24. SIR IAN HAMILTON, *A Staff Officer's Scrap Book*, II. Consult the same work on the unsuccessful pursuing action fought by the 3rd Brigade at the Chosenrei Pass.

†VON LÜTTWITZ, *Angriffsverfahren der Japaner*, p. 47.

‡*Ibid.*, p. 26.

¶*Ibid.*, p. 52. The attack order of the 5th Infantry Division, in *Urteile und Beobachtungen von Mitkämpfern*, I, p. 121.

§BRONSART VON SCHELLENDORFF, *Beim japanischen Feldheer*, pp. 217, et seq, 225 et seq, 242 and 244, et seq. On the use of sand bags, consult *ibid.*, pp. 286 and 292.

to the present time in European armies. It shows, moreover, the advantages of thin firing lines during the preparatory stage of the action, and the insignificant effect produced by shrapnel and long range fire on such lines in which it is desirable to advance, without halting on the way, to within 1000 yards of the enemy. The necessity of gaining a superiority of fire before advancing to the assault, and the necessity of an increased supply of ammunition, are confirmed anew. It is further demonstrated that the bayonet of the infantryman is still capable of playing an important role in battle."

2. THE CONDITIONS UPON WHICH SUCCESS DEPENDS.

The Russo-Japanese war confirms the opinion that the issue of combat is but little influenced by the formations taken up; that *esprit* and the determination to conquer are of far greater importance than any formation. The most difficult task that infantry can be called upon to perform consists of successfully pushing home an attack over open ground commanded by hostile fire. "It would be wrong," said Fieldmarshal Moltke, "were one to attempt to lay down in regulations that a force should not advance over a plain against an enemy under cover. *But every superior commander ought to consider what such an operation portends.*" Heavy losses are unavoidable in a destructive fire fight lasting for hours.* The attack will not succeed so long as the enemy commands the plain with his fire. The commander of the attacking force must find ways and means to wrest this command from the enemy. All of the battles of recent campaigns have demonstrated that an attack is bound to succeed if it is thoroughly prepared by infantry and artillery fire, is undertaken by adequate forces, and is pushed with determination close to the enemy; and that such an attack is, in fact, superior to the defensive. The success of an attack on a position prepared

*General VON SCHLICHTING, in his work *Taktische und strategische Grundsätze*, maintains the opinion—in contrast to General VON SCHERFF—that open terrain commanded by hostile fire is impassable for infantry. At any rate, military history has yet to furnish proof of this.

for defense might depend upon the following preliminary conditions:

(a) Careful reconnaissance, for the purpose of determining the most favorable direction for the attack.

(b) Occupation of the foreground of the hostile position. When the foreground is entirely open, an advance must be made under cover of darkness up to the medium ranges.

(c) Preparation of the infantry attack by the closest coöperation of infantry and artillery.

(d) Timely determination of the point at which the decisive attack is to be made.

(e) Careful utilization of the terrain during the advance, so as to allow of delaying the opening of fire until the force is as close as possible to the enemy.

(f) Suitable disposition, distribution in depth, and deployment of a strong force for the purpose of bringing about a superiority of infantry fire. The organization detailed to make the attack must have its entire effective strength available for accomplishing its proper task, and not be compelled to detach parts for guarding its flanks.

(g) Ensuring concerted and simultaneous action on the part of the attacking forces. As the enemy has given up any idea of assuming the offensive, at least for the time being, the attacker should not allow the advantage to escape him of choosing time and direction of the attack.

3. PREPARATION OF THE ATTACK.

Reconnaissance. Preparatory Position.

"If the enemy decides to stand on the defensive, he renounces the initiative for the time being. The attacker will then have time to reconnoiter the hostile position and to weigh all the circumstances that favor the attack. He should not limit himself to reconnaissance by the cavalry and to observa-

tion through field glasses. Mounted officers and infantry officers' patrols should supplement this reconnaissance, and complete the information gained as the enemy is approached." (Pars. 362 and 363 German I. D. R.).

The local reconnaissance (see p. 248 supra) should be conducted with all possible care; timely directions should be given in regard to it during the approach to the battlefield;* the activity of the reconnoitering bodies should continually increase as the enemy is approached; and the work itself should be divided in a systematic manner. Excessive thoroughness may retard reconnaissance work to such an extent, on short winter days especially, that success may be jeopardized. (Par. 305 German I. D. R.). As a result freedom of action will be lost and the energy of the attack weakened. It would be wholly wrong to postpone the decision for making the attack until something definite is known of the strength and dispositions of the enemy. These matters are almost never cleared up until after the battle. The decision as to whether or not an attack should be made is determined primarily by the general situation. (Par. 355 German I. D. R.). The latter may force a commander to advance promptly without permitting him to await the results of the reconnaissance. The character of the terrain and the preparation the enemy is known to have made, determine whether the commander ought to attack at once, whether he ought to utilize the cover of darkness for the advance of the attacking troops, or whether he ought to attempt to maneuver the defender out of his position.

The information required as a basis for this decision will, as a rule, not be obtainable without a fight. In spite of all the objections arrayed against reconnaissances in force, they cannot be avoided, if it is desired to gain prompt and certain insight

*According to experience the reconnaissance work generally flags during a halt, although that is the very time when an increased activity is desirable. The reconnaissance work in the IXth Corps on August 18th, 1870, from the arrival at Caulre until the advance guard opened the fight, is particularly instructive. *Der 18. August*, pp. 124, et seq and 215.

into the enemy's situation. It cannot be expected that the defender will passively permit the assailant to gain an insight into his dispositions. A feint will accomplish nothing; the enemy must be seriously engaged, so that he will show his hand.* Yet in spite of these combats, misapprehensions are not precluded.

It is quite natural that isolated detachments, in their endeavor to gain an insight into the hostile dispositions, may find themselves suddenly within short range of the enemy. In such a situation, the detachment should maintain its position, as its fire will frequently facilitate the approach of the other attacking troops. Almost every one of the more serious engagements furnishes examples illustrating this feature.†

In order to guard the reconnoitering troops from being driven back, if for no other reason, it is advisable to place in readiness an adequate force of artillery. As the artillery is protected by shields, it can take up the fight even against superior artillery with better chances of succeeding than in the past.

If the commander has decided to attack and has determined against what part of the hostile position the main attack is to be made, the foreground of the hostile position is at once occupied, and the enemy's advanced troops forced back, so as to prevent the defender from gaining an insight into the dispositions of the assailant.

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*It was the intention of the Japanese commander-in-chief, on October 10th, 1904 (battle on the Shaho), to attack the Russian army before it had completed its concentration for battle. The advance guards of the Reserve Division and of the 5th Division encountered advanced Russian detachments at Kushutsy (Xth Army Corps), and at Wulitaisy (XVIIth Army Corps), whose weakness was, however, not recognized. In the belief that the Russian main position had been encountered, the advance on the hostile position was ordered for the night 10/11th October, the attack to take place at daybreak on the 11th. 9th Supplement to the *Militär-Wochenblatt*, 1906, p. 327.

†The perseverance of Nambu's Brigade on March 7th, in the "three houses" (Yuhuntun near Mukden). *Vierteljahrshefte*, 1907, p. 78. The perseverance of the troops in the Palungshan works, captured on August 22nd, 1904, by being enveloped on both flanks. (Port Arthur). *Streffleur, Einzelschriften*, 4, pp. 81 and 91. The perseverance of parts of the IInd Battalion of the 3rd Guard Regiment in the engagement at Towan (31st July, 1904). *Urteile und Beobachtungen von Mitkämpfern*, I, p. 60.

The assailant should launch as few troops as possible for initiating the action. They should avoid engaging prematurely in a fire fight with the infantry of the hostile main position, even if the terrain would permit a covered approach to short range. If the advanced troops allow themselves to be enticed into doing this, they expose themselves to the danger of suffering a defeat, and oblige the commander of the whole force to launch for their relief troops that were intended for the main attack.*

Insufficient information in regard to the enemy and undue precipitation in issuing orders may place advanced troops in such an unfavorable situation. If the defender allows himself to be tricked into assuming the offensive for the purpose of driving off harassing detachments, so much the better for the assailant, for the latter's artillery will then find an opportunity to fire on the enemy. †

Austria. "Under certain circumstances, the covering troops will have to be reinforced at an early moment in order that a strong line may be formed opposite the enemy, but, in many cases, they will nevertheless still abstain from advancing into the zone of effective fire." The Austrians usually employ strong covering bodies. The Germans desire to ensure simultaneous action on the part of all the troops in opening the combat.

At **Spicheren** the commander of the 14th Infantry Division, under the erroneous assumption that the heights of Spicheren were only occupied by troops covering the entraining at Forbach, issued orders to General von François to drive away the hostile artillery. All of Frossard's Corps, however, was in position on the heights on which the artillery was posted.‡

At 10 A. M., on August 6th, 1870, the commanding general of the Vth Army Corps issued orders to the advance guard to cross the Sauer with four battalions at **Wörth** and **Spachbach** (1500 m. apart) and to occupy Wörth and the heights beyond, where the entire corps of Mac Mahon was in position.¶

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*"It is a general principle to push as close as the terrain permits to the enemy's position with advance troops for the purpose of opening fire."

†The French regulations hint at this. Look up the advance of French infantry during the combats around Ste. Marie aux Chênes. *Der 18. August*, pp. 174 and 179.

‡*Gen. St. W.*, I, p. 310.

¶*Gen. St. W.*, I, p. 320.

The advance of the attacking troops, under cover of the advance guard, into a preparatory position, is made in such a manner that units are opposite their objectives when the subsequent forward movement against the enemy is begun.* This frequently requires a rearrangement of the forces so that even an assailant who is numerically inferior may be superior at the decisive point. A simultaneous attack from the front and flanks requires reserves everywhere and is opposed to the economical employment of the forces; it may easily lead to failure, and is justifiable only when the assailant is greatly superior in numbers or morale.

A premature deployment impairs the leader's influence on the course of the combat and makes it difficult to change the direction of the attack. Route columns, taking advantage of all available cover, will, therefore, be retained as long as possible, and only subordinate units permitted to march directly toward their proper objectives, until the hostile fire compels a more extended deployment (development). The preparatory position is taken up in the last sheltered area in front of the hostile position, provided that that area is large enough to accommodate the attacking force when deployed for action, and to shield it from the observation and the fire of the enemy.

In country generally devoid of cover, infantry will have to be placed in a preparatory position when three kilometers or more from the enemy, even when the latter's artillery will in all probability be neutralized by our own.

"In order to ensure the concerted advance of the various units into the preparatory position, it is advisable, especially in close country, to have them move from one covered position to another. If this is done, units whose march was favored by the nature of the ground, will not arrive prematurely within dangerous proximity of the enemy, while others who had farther to go, or whose advance was difficult, are still a considerable distance to the rear. The leader should make his

*The deployment of the 1st Infantry Brigade of the Guard, near Ste. Marie aux Chênes, against St. Privat. *Der 18. August* p. 408.

dispositions so that no loss of time will result from this advance from one covered position to another." (Par. 369 German I. D. R.).

Where large forces are concerned, the attack on a position carefully prepared for defense will consume several days, the assailant placing his artillery in position on the first day and reconnoitering under cover of infantry, which is pushed to the front.* The troops of the first line are pushed forward far enough before daylight so that they can intrench under cover of darkness and open fire at dawn. This will be more difficult to accomplish when covering troops or advanced positions are located in front of the hostile position. If the assailant has succeeded, on the previous day, in driving these troops back upon the main position, an advance to within effective range may be made during the night in order that the fire fight may be opened on the succeeding day. Although the chance of taking the enemy by surprise is eliminated in such a case, the advantage of having diminished the distance that will have to be crossed under fire remains.†

It is difficult to find shelter for the rearward echelons, which must be kept in readiness in very close proximity to the leading line. These rear echelons must either be intrenched or at least sheltered by masks. General actions should be avoided at night.

4. THE COÖPERATION OF INFANTRY AND ARTILLERY IN BATTLE.

Upon completion of the concentration for action (development), the infantry has to advance within the zone of effective infantry fire. In doing this the infantry must either pass by or through the artillery which is already engaged.‡

*The attack on fortified positions is discussed in detail in *Taktik*, V, p. 237, et seq., as it depends upon the closest coöperation of field artillery, foot artillery, infantry and pioneers.

†The engagement at Belmont, on Nov. 22nd, 1899, furnishes an interesting example of unforeseen friction. The advance, in this instance, was made during the night from a point 8 km. from the enemy.

‡See p. 316, et seq.

During the Russo-Japanese war, the effect of shrapnel, in spite of the mediocre matériel and the lack of shields, forced the artillery of both belligerents to seek shelter on the reverse slope of heights. When this was neglected and when batteries went into position in the open, within effective range, they were quickly silenced. The fear of shrapnel caused both sides to advance cautiously, to relinquish all close order formations at an early moment, and to employ the spade extensively. This alone was evidence of the fact that the artillery had accomplished a good deal. Moreover, it was not altogether accident that the first few of the larger Japanese night attacks occurred coincidentally with the appearance of Russian artillery matériel, which was superior both as regards numbers and power. The new German I. D. R. (par. 444), in contrast with the previous edition (II, par. 82), prescribe that the infantry attack should not be postponed until a superiority of fire has been gained. Thus, the regulations draw logical conclusions from the modern armament and seek to avoid useless bombardments of hostile positions (such, for instance, as the Russians indulged in at Plevna and the British in South Africa).

"The principal duty of field artillery is to support the infantry in the most effective manner. Its duties are inseparably connected with those of the infantry. It should, on principle, always fight the targets that are most dangerous for its infantry." (Par. 364 German F. A. D. R.).

The German Field Artillery Drill Regulations prescribe that the guns should fire over the heads of the advancing infantry (par. 375), and that single batteries should accompany the infantry attack to within close range of the enemy (par. 471). When an assault is to be made, the infantry expects the artillery to direct its fire against the point of attack until immediately before the assault begins.

"But our infantry should never be obliged to dispense with the support of artillery. The gun shields afford considerable protection, even at the short ranges. *At the decisive moment the artillery should not shrink even from the heaviest infantry fire."* (Par. 369 German F. A. D. R.).

"In selecting an objective, it is essential for the artillery to consider whether, by fighting it, the infantry will be effectively supported. Whether the hostile infantry or artillery is chosen as an objective will depend upon the situation. As a rule, the hostile artillery will be the proper objective for our artillery during the preparatory stage of the action. As the distance between the opposing infantry forces decreases, it will become more and more necessary for the artillery to devote itself to the hostile infantry." (Par. 432 German F. A. D. R.).

If the artillery is equipped with shielded guns, it can devote itself for some time to the most important target without regard to the hostile artillery, contenting itself with merely occupying the latter's attention. (Par. 469 German F. A. D. R.). To silence artillery in a concealed position requires curved fire and a good deal of ammunition; but, on the other hand, artillery so posted cannot fire upon advancing skirmishers.* Therefore, the advancing skirmishers of the assailant should force the hostile artillery to leave its cover and to expose itself to the attacker's artillery. (Pars. 330 and 496 German F. A. D. R.).

The result of this procedure will be that the artillery of both sides will engage each other's attention with only a small part of their guns, and concentrate the remainder on the hostile infantry. It is obvious that the infantry will very soon demand of its artillery in definite terms that it should first annihilate the hostile artillery before the infantry can think of continuing the attack.

The provisions of the German regulations in regard to the fusion of activities of infantry and artillery mark an entirely new departure. The commencement of the infantry attack is accordingly no longer dependent upon the result of the artillery combat; on the contrary, both combats are of equal importance and proceed along parallel lines; the only danger is that the infantry may make a headlong rush to the front before a superiority of fire has been gained.

*This is partly due to the fact that fire cannot be adjusted quickly enough, and that it is difficult to follow moving targets. Besides, when the targets are small and numerous, they are difficult to hit.

Confidential British instructions, dealing with the lessons learned by the Japanese in Manchuria, contain the following: "Intrenched artillery can be permanently silenced only under very exceptional circumstances, as it will withdraw its personnel temporarily, as soon as the hostile fire becomes too hot, and resume its fire again when that of the enemy abates. The infantry attack should therefore be launched without awaiting the result of the artillery combat, but the infantry must insist upon the artillery completely engaging the attention of the hostile guns during the advance. Another reason for not awaiting the outcome of the artillery combat, lies in the great frontage of battle lines. The unsuccessful attack made by a division will then frequently cause the neighboring unit to make an immediate attack."

Austria (1904). "The artillery must be given an opportunity and the necessary time for effectively preparing the infantry attack. So long as the artillery engaged with the hostile batteries has not achieved a noticeable success, or is not at least neutralizing the hostile artillery, the infantry attack remains a difficult undertaking."

France. The artillery during the preparatory stage of an action: The artillery should endeavor to silence the hostile artillery as quickly as possible, without employing more guns than are absolutely necessary. The commander should give the order for the attack only when the preparation is considered sufficient.

England. The regulations emphasize the necessity of pushing infantry forward, and of supporting that infantry energetically, so as to compel the defender to expose himself. "As soon as the hostile batteries have been sufficiently silenced, or the infantry advances to the attack, the fire is directed upon the point of attack in order to prepare and to cover the assault."

Italy. The regulations state that artillery is a supporting arm for infantry. "If the hostile artillery discloses its position from the start by employing direct fire against the assailant's artillery or infantry, the attacker's batteries endeavor to silence it or to draw its fire upon themselves, in order to facilitate the deployment of their own infantry. If, on the other hand, the hostile artillery remains concealed for the purpose of saving its fire for the infantry when the latter offers a favorable target upon arriving within effective range, then it would seem advisable for the artillery of the assailant not to open fire at all, or to open fire only with enough guns to cope with the available targets. The assailant's artillery brings the fire of all its batteries into play when the defender's artillery is compelled to come into action in order to support its own infantry against the advance of the attacker's infantry.

The difficulties of providing for coöperation between infantry and artillery are due to the impossibility of distinguishing at all times with certainty between friend and foe (assault-

ing guidons),* since the elimination of powder smoke and the adoption of neutral tinted uniforms; and, further, to the circumstance that, while we have a signal for increasing the range of the artillery (g. g. g.), we have none for indicating that the fire is to be concentrated upon certain points. "Uninterrupted communication with the fighting line in front must be provided for. For this purpose officers, who report by signal or by telephone, should be sent forward. These officers are primarily to ascertain how close their own firing line is to the enemy, in order that the artillery may keep up its fire as long as possible." (Par. 376 German F. A. D. R.). In England, it has been suggested to indicate the point upon which fire is to be concentrated, by the colored ball of smoke of a special projectile. It requires strict attention on the part of the infantry to make its work harmonize with that of the artillery. Every opportunity, for example, when the hostile infantry is forced under cover by a burst of fire, should be utilized for advancing. This is particularly emphasized in France. The defender is to be blinded by smoke and a hailstorm of fragments. "Every rafale of the artillery will either cause the most advanced line to make a rush, or the troops of the rear line to come up to the firing line in order to reinforce it or to carry it forward as much as possible. Thus the rafale becomes a veritable shield for the infantry (*vertiable bouclier de l'infanterie*)." LANGLOIS.

5. THE POINT OF ATTACK.†

The reconnoitering troops are charged with the duty of ascertaining the parts of the hostile position which can be approached under cover, which are weaker than the others (frequently true of the flanks),‡ or which can be enfiladed. The attack will usually be directed against the weakest point

*During the attack on the Waterberg, on August 11th, 1904, the various units were ordered to carry, on their outer flanks, flags attached to long poles. These flags were white in Estorff's, red in v.d. Heyde's, blue in Müller's, and green in Deimling's detachment.

†See *Taktik*, V, p. 138.

‡Example: The right flank of the French position at Wörth, and at Roncourt (St. Privat).

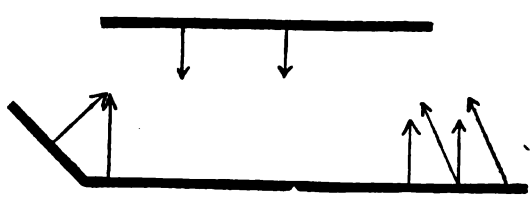
in the hostile position, or that on which the greatest volume of fire can be concentrated from enfilading or commanding positions. At all other points of the battlefield, the assailant will endeavor to deceive the opponent, with weak forces, as to his true intentions, but, at the decisive point, he should launch superior numbers. The French regulations contend that such weak points will only become apparent during the course of the fight, and therefore separate the troops into a preparatory and a decisive combat group.

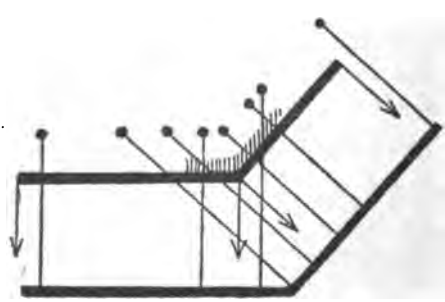
The desire to strike the weakest point in the enemy's line causes the decisive blow to be directed against a flank, and the numerical superiority requisite for gaining the superiority of fire, leads to

6. ENVELOPMENT.

(Pars. 392—396 German I. D. R.).

The desire of the attacker to put a superior number of rifles into the fight, in order to gain a superiority of fire more quickly, naturally leads to an extension of the firing line and to an overlapping of the defender's line. The advantage of overlapping the enemy's line lies in the fact that part of the





line attacked is exposed to both frontal and oblique fire. The effect of this oblique fire is increased by bending the wing of the attacking line toward the enemy. If the attacking line succeeds in pushing its firing line so far forward that not only the hostile wing but also the hostile flank is struck, an envelopment is brought about with the result that the lines of fire of the assailant cross each other within the hostile position. If the defender refuses a wing, portions of his line may be enfiladed. This will cause such heavy losses that the defender will begin to succumb first at the salient point of his line. A further advantage is gained by a pressure on the enemy's line of retreat.

Pure frontal attacks offer little prospect of success;* they may perhaps force the enemy back, but they cannot annihilate him.

For carrying out the attack itself, it is immaterial whether the commander launches it against the hostile front or a hostile flank; individual companies, battalions, and, in large units, regiments, finally make a frontal attack anyway. The fear of the front of the enemy should not lead the enveloping force to attempt to execute another enveloping movement when it encounters a newly formed front. Surprise is, to a certain extent, essential to the success of a flank attack.† The troops holding the enemy in front [secondary attack] must, therefore, hold him in such a manner as to keep him in ignorance about the true point of attack, must so engage his attention that he will finally place the bulk of his force into the frontal action. If this does not occur, the opponent will soon distinguish sham from reality and will not oppose a weak, inactive containing

*It is only necessary to invite attention to the first attacks made by the Prussian Guard against St. Privat, and to the attack made by the 72nd, 40th and 11th Infantry Regiments against the height of Maison Blanche south of Rezonville, on August 16th, 1870. KUNZ, *Kriegsgeschichtliche Beispiele*, 8-10, p. 128.

†The attack of the Guard at Chlum (Königgrätz). v. LETTOW-VORBECK, II, p. 474. The assault and capture of the hill of Forbach at Spicheren by six battalions of the IIIrd Army Corps. *Gen. St. W.*, I, p. 356. The assault and capture of the Mont de Brune (Beaumont) by 6½ Prussian companies, which were followed by 4⅘ companies more. The hill mentioned was defended by 6 battalions and 3 batteries; 6 guns were captured. HOPFFGARTEN-HEIDLER, *Beaumont*, pp. 132 and 227.

force with more troops than are absolutely necessary. In this connection, compare the conduct of the Ist Army at Königgrätz and of the Prussian Vth Army Corps at Wörth with the vacillating action of the Russian IIIrd and Ist Armies at Sandepu.* So long as the enemy is not firmly held in front, he will be able to evade an envelopment by withdrawing. The combats of the Boers in the Orange Free State furnish numerous examples of this fact. The Austrian regulations have very properly coined the term "attack on two fronts", which better indicates the task of both parts of an attacking force.

Whether the decisive blow is directed against the front or a flank, depends upon the result of the fire. The advantages offered by an enveloping movement must not lead to holding the enemy once and for all in front, while the main attack is directed against his flank. A frontal attack made in conjunction with a threatening demonstration against the hostile flank frequently offers far greater prospects of success.† If a superiority is to be employed to advantage, an envelopment must be made; all objections advanced against the "enveloping craze" are disposed of by this statement.‡ "A condition precedent to an envelopment is that the enemy be held in front. For this purpose a determined demonstration is most effective." (Par. 392 German I. D. R.).

The risks involved in an envelopment must not be overlooked—overextension and dispersion of the troops;¶ the possibility that the troops fighting in front and those fighting on the flank, separated from each other, may be defeated in detail, whether this be brought about by the defender assuming the offensive, or by the force holding the enemy in front allowing itself to be enticed into making a premature advance and suffering a defeat before the envelopment has a chance to become effective.

*_Taktik_, V, p. 42.

†The attack on Flanville, on September 1st, 1870, is an instructive example. KUNZ, _Noisseville_, p. 87, _Gen. St. W._, II, p. 1467.

‡V. D. GOLTZ, _Das Volk in Waffen_, pp. 328 and 332. BLUME, _Strategie_, p. 170. MECKEL, _Truppenführung_, p. 221.

¶The attack made by François' Brigade during the battle of Spicheren. _Gen. St. W._, I, p. 318. Between 12 and 1 o'clock, this brigade covered a front of 4000 m. See p. 262, supra.

"The envelopment is effected in the simplest manner if the forces designated for this task, when still at a distance from the enemy, are given a march direction that will bring them against the hostile flank.

"When initiated during the development for action or when carried out by retained reserves, the envelopment is much more difficult." (Par. 393 German I. D. R.).

In the last-mentioned case it may happen that the force detailed to make the flank attack strikes the enemy's front instead of his flank. The same is true of attempts to envelop with parts of the infantry of the first line that are already deployed, perhaps already engaged, when the terrain is not specially favorable for such a movement. Such movements may, in special cases, be carried out at night. (Enveloping movements of the divisions of the Japanese IIIrd Army at Mukden). As a rule, this brings about only an overlapping and flanking of the parts of the hostile position next adjacent to the wing making the movement, but does not produce a concentric effect on the hostile flank. Yet, even weak detachments that reach positions from which they are able to enfilade the enemy, facilitate the advance to the front.

In starting an enveloping movement when at a considerable distance from the enemy, the force which is to make it, is directed upon a point located in rear of the hostile position, approximately where his reserves are presumed to be. If then the fighting line is further extended toward the outer flank, the assailant avoids facing the hostile front directly, and will almost invariably have a start over the defender in extending the threatened wing. The troops still in the act of withdrawing from the route column naturally take charge of the protection of the flanks.*

If a flank march in front of the enemy should become necessary, it can be undertaken with sufficient safety only when proper preparations have been made—distribution in depth,

*Compare the deployment for action of the 1st Guard Division at Königgrätz with that of the 4th Japanese Division at Wafangu. In the last-mentioned case, the leading (19th) brigade was launched in a very skillful flank attack; the second brigade took charge of protecting the flank.

shortening of route columns, due regard being had to protection of the front and flanks—to permit a deployment of the force at the right moment and in a suitable formation toward the hostile side.* Within effective range of the enemy, such a movement by the flank can be carried out only when cover is available, otherwise the hostile fire will very quickly force the troops making the flank march to face to the front.†

The attempt of the 16th Infantry Division to envelop the French position on the **Hallue**‡: The 30th Brigade used the road leading along the hostile front from Querrieux to Frechencourt, for its movement. The leading regiment of the brigade, the 28th Infantry, on debouching from Querrieux, immediately faced toward the annoying flanking fire and endeavored to advance in the face of it, while the brigade commander, energetically carrying out the orders given him, led the 68th Infantry toward Frechencourt, thus forestalling several French battalions that were hurrying up from the east. The village was occupied and held by the 68th Infantry, but a frontal offensive movement against the hostile main position could not be carried out from here either, in spite of the inferiority of the French troops.

Whether an enveloping force can be sent into action at once without being first placed in a preparatory position¶ or whether it should first be concentrated, depends upon the situation of the troops engaged in front with the enemy (the necessity of relieving the pressure on the Ist Army engaged in front with the enemy at Königgrätz), and upon the countermeasures taken by the enemy. If the assailant encounters a

*v. SCHLICHTING, *Taktische und strategische Grundsätze,* I, p. 90, et seq. The attack of the six Brandenburg battalions against the Hill of Forbach (Spicheren) is especially instructive in this connection. The attacking force was threatened by hostile troops lodged in the Stiring Wald. The first deployment caused the attacking force to face toward the front of the French position. As soon as this was noticed, the skirmishers were withdrawn in order to be pushed into the fight again at another place. GERNIER, *Einmarschkämpfe,* p. 184.

†Look up the conduct of the 22nd Infantry Division at Villermain-Cravant, on December 8th, 1870. It is indeed true that a violent snow storm and thick weather made it possible for this force to disengage itself from the enemy and to join the Ist Bavarian Army Corps at Cravant.

‡v. MALACHOWSKI, *Frontalschlacht und Flügelschlacht,* p. 24, et seq. KUNZ, *Nordarmee,* I, p. 134, et seq. In regard to the conduct of the 15th Infantry Division, which was to hold the enemy in front and which advanced prematurely before the enveloping movement of the 16th Division had become effective, consult p. 232 supra, and *Taktik,* V. p. 163.

¶According to the opinion of General v. SCHLICHTING, a preparatory position should be taken up. *Taktische und strategische Grundsätze,* III, pp. 133 and 154, et seq. See *Taktik,* V, p. 174.

newly formed front, it would be a mistake for him to attack successively with the different units.

Whether the troops holding the enemy in front participate in the assault during an enveloping movement, depends upon circumstances. They may frequently better ensure the success of the attack by delivering an enfilading fire than by advancing. The commander should, at any rate, not lose sight of this advantage. If both groups (the enveloping and the holding group) advance to the decisive attack, they should do so simultaneously. The group holding the enemy in front must resist the temptation of moving to the front before the envelopment can become effective.*

The attack on **Ste. Marie aux Chênes,** on August 18th, 1870,† and that made by the 37th Infantry Brigade on **Ladonț** are models worthy of imitation. "The brigade commander personally directed Lieutenant-Colonel v. Hagen (commanding the troops holding the enemy in front) to have the signal 'forward double time' sounded as soon as he could see the skirmishers of the 78th Infantry coming over the heights to the right front."

At **Gorni Dubniac,** on October 30th, 1877, the scheme of designating the moment for attack by means of artillery salvos, failed. During the attack on **Scheinovo,** on January 9th, 1878, the simultaneous advance of Prince Mirski's troops was regulated by the clock.

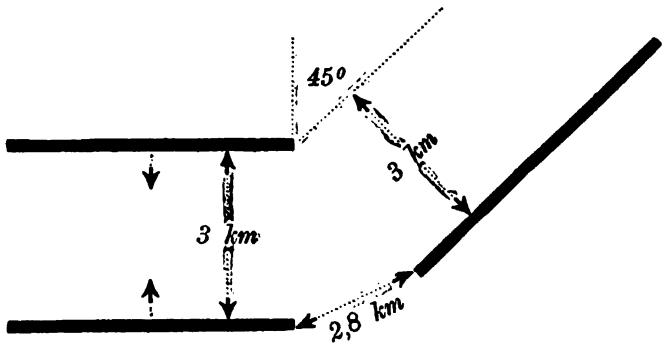
If the attacker desires to deliver an effective blow against the enemy's flank, *a considerable interval must be left between the troops charged with the holding attack* [secondary attack] *and those detailed to make the flank attack,* when the envelopment is initiated. (Par. 393 German I. D. R.). The width of this gap is increased to a seemingly dangerous degree by the range of modern weapons, but real danger is not to be apprehended as a counter-attack of the defender exposes both of his flanks to an enveloping attack. If the enveloping group

*Consult *Der 18. August,* pp. 377, 561 and 590, in regard to the attack made by the Guard and the Saxons and the premature attack made by the Guard at St. Privat.

†The 1st Infantry Division of the Guard received orders "to form for attack against St. Privat, but not to attack that village before the expected arrival of the Saxon Corps." *Der 18. August,* pp. 167 and 288.

‡HÖNIG, *Gefechtsbilder,* III, pp. 58 and 49.

continues to advance, that advance in itself will very soon set a limit to the enemy's counter-attack. The seemingly dangerous gap in the line, at the commencement of an action, is closed more and more as the enemy is approached. Nevertheless, this



gap may induce a cautious leader to draw the enveloping group closer to the frontal group, thereby impairing the effectiveness of the envelopment. The flanking groups accomplish the best results, but in following up tactical objectives, they should never lose sight of the annihilation of the enemy. The difficulty of coördinating the action of the separated parts of the line is greater than the danger to be apprehended from a hostile counter-attack against the frontal group. As a rule, the entry of the enveloping group into action will be the signal for a general attack. The effectiveness of the enveloping attack is proportional to the energy with which it is made, but the danger to be apprehended from a hostile counter-attack increases in the same ratio.

Provisions of Various Regulations.

Austria. When possible, the reserve is to be designated to make the enveloping movement. (Par. 407 Austrian I. D. R.). When practicable, a part of the reserve is employed from the start for the envelopment, and, under certain circumstances, also for the purpose of gaining positions from which an enfilade fire can be delivered, and for supporting the advance of the frontal attack. The group holding the enemy in front may at first fight a purely defensive action to prevent a hostile counter-attack, to screen our own dispositions, and finally, by means of a fire fight at effective ranges, to hold the hostile troops in their position.

France. The envelopment is occasionally mentioned in the regulations (for example in pars. 290, 301 and 302). The Field Service Regulations, in discussing the attack, whose different stages may vary in length depending upon the intentions of the commander, state, however, that the attacker "may assail a wing or a flank of the enemy, with superior forces, for the purpose of annihilating him."

England. The importance of flank attacks, even those in which the defender is subdued by the flanking fire of mounted troops, is specially mentioned, but, in this connection, it is emphasized that it is immaterial whether the attack is finally directed against the front or a flank of the enemy. The holding attack is to be carried out with energy in front to prevent the enemy from drawing reinforcements to other points.

Italy. While the regulations of 1891 still unqualifiedly acknowledged that any frontal attack might succeed, the regulations of 1903 called attention to the importance of the envelopment, without denying "that the frontal attack might be the decisive one." Surprise is an advantageous factor for success, and for this reason, even covering troops, for example, may have to be dispensed with on the march.

If a force desires to take the enemy by surprise, it must carefully take advantage of the ground. The surprise may be made more complete, if the accompanying frontal attack is energetically pushed. On the other hand, considerations for the troops in the holding attack, set a limit to the extension of the flanking movement. The fire power of the troops in the holding attack must not be exhausted, or the troops themselves defeated by a hostile counter-attack, before the moment of the general advance arrives. They must pay the strictest attention to the course of events on the opponent's side; if the enemy retires, or shifts parts of his force in order to meet a flank attack, the troops in the holding attack must act with energy. If such signs are not apparent, a frontal advance will, as a rule, be proper only when the pressure of the flank attack makes itself felt on the enemy's line. This is the only way in which "simultaneous action by both attacks may be ensured, and this is of decisive importance to the successful issue of the combat."

7. REMOVAL OF PACKS.

It is advisable for infantry to remove packs for an attack; such tremendous physical exertions await the troops that everything ought to be done to reduce the load carried by the individual man.* "As soon as it becomes doubtful whether the troops will be able to perform the task assigned them in action without such relief, all independent commanders, and, in organizations larger than a regiment, commanders of regi-

*Examples from military history in *Militär-Wochenblatt*, 1902, No. 32.

ments and of higher units, have authority to order the men to remove their packs. In issuing such an order they should bear in mind the disadvantages which may result from leaving the packs behind. When knapsacks are removed, the ammunition and iron rations should be taken from them. Overcoats, cooking utensils, canteens, bread bags, and intrenching tools remain on the men." (Par. 301 German I. D. R.).

According to the French Manual of Field Engineering, the skirmishers, especially when intrenching, may utilize the knapsack as cover.

In a defeat knapsacks will frequently be lost. Thus the Russians, after the second battle of Plevna, and Frossard's Corps, after the battle of Spicheren, lost their knapsacks with camp equipment and iron rations, and, in consequence thereof, suffered great hardships during the succeeding days. On the other hand, during their retreat, the 43rd, 44th and 45th Infantry Regiments of the Ist Army Corps managed to recover without trouble the packs which they had removed before entering the battle of Trautenau.

The infantry of the Xth Army Corps had left its knapsacks behind on August 8th, 1870, and did not get them again until the early part of September. The knapsacks were not hauled on wagons after the organizations, but were left at the railroad station of St. Ingbert. On August 6th, 1870, the Würtemberg Field Brigade had left its knapsacks in a bivouac near Reimersweiler at the risk of never seeing them again. Among other reasons, General v. d. Tann considered it impossible for the 2nd Bavarian Division to advance beyond Wörth, because the organizations might perhaps thereby have been separated for several days from their baggage, which they had left behind between Preuschdorf and Görsdorf.

When knapsacks are removed, a detachment will have to be left behind to guard them, otherwise they may be robbed of their contents.* The troops always consider the trip to the rear to get the baggage a special hardship; wagons will very rarely be available for this purpose, as after great battles all the wagons in the entire neighborhood will be requisitioned for transporting the wounded, and as supply wagons will, as a rule, not be at hand.

*This was neglected by the 20th and 85th Infantries, on August 16th, 1870.

8. THE EMPLOYMENT OF MACHINE GUNS.

In an attack upon a defensive position which is held in force, machine gun batteries will generally be held in rear for the time being. They form a mobile reserve in the hands of the commander-in-chief, who may employ it for quickly reinforcing threatened points, for exerting a pressure upon the wings and flanks of the enemy, and for preparing the assault. Machine gun companies, either broken up into platoons or not, as the case may be, endeavor to reach positions from which they can facilitate the advance of their infantry.

It is especially advantageous if the fire that is directed upon the point where the hostile position is to be penetrated, comes from a position permitting a good view, or from an oblique direction, because the fire will not have to be discontinued even when the infantry continues its advance or moves to the assault. If such a position, permitting the greatest fire effect, is reached (at about 800 m. or less from the hostile position) any further advance of the machine guns is faulty, because it interrupts the fire and necessitates fresh laying and adjustment.

Upon the victorious termination of a fight, the machine guns should participate in the first stages of the pursuit by making an extended use of their fire. They hurry forward into the captured position, as soon as it is apparent that the victory has been gained, in order to support the infantry in holding the position, to cover the infantry while it is re-forming, and to reduce the last vestige of the enemy's resistance. If the attack fails the machine guns cover the retiring troops.

9. THE CONDUCT OF THE ATTACK.

In an infantry attack, the art of minor troop leading consists of pushing a firing line, superior to the enemy, to the strip of ground from which the power of our rifle can be utilized to the best advantage for vanquishing the enemy; sec-

ondly, of bringing up supports, without exposing them to unnecessary losses, so that they will be promptly available in case of need. The preparations which the enemy has made for attaining the maximum fire power (by intrenching, placing ammunition in readiness, and by ascertaining ranges) must be offset by employing a superior number of rifles. The commander who brings a greater number of rifles into action than his opponent, may count on gaining a superiority of fire quickly and with certainty.

The task of higher troop leading consists of simultaneously launching the troops against the common objective.

The effect of modern projectiles requires that, on open ground, the first deployment be made when 4000—5000 m. from the enemy. The best scheme would be to advance, without halting, to within decisive short range of the defender, and then to open fire, but, as previously stated, the defender should endeavor to prevent the assailant from ever reaching these ranges. This design of the defender must be frustrated; if artillery is unable to accomplish this, machine guns or a part of the infantry must enter the fight; but all parts of the force not required for this fire fight at medium ranges should continue their movement without interruption.

The most difficult task that infantry may be called upon to perform consists of advancing over an open plain, in the face of unsubdued artillery, when the situation does not permit night or the effect of an envelopment to be awaited.

The first deployment as skirmishers is made for the purpose of protecting the advancing troops against surprise. Frequently, a squad or a section per company will suffice for this purpose, but these units should cover the entire front available for the organization to which they belong. A uniform and simultaneous advance along the whole line is impossible however, on account of the diversity of the ground at various points. When cover is available, skirmish lines may be formed quickly and pushed forward as entities, but when cover is lacking, firing lines may have to be deployed slowly and piecemeal.

The unit that has pushed farthest to the front must facilitate with its fire the advance of those who have encountered greater obstacles in advancing.

Long, dense firing lines and the supports following them are exposed to such heavy losses in open country, even at long ranges, that their advance will soon hesitate. Moreover, the defender will only fire on targets whose size and density promise a great number of hits. Therefore, the assailant should endeavor to lead his infantry forward in loose, disconnected skirmish lines, which are difficult for the enemy to hit. As a rule, the assailant should not open fire until after he has been reinforced and has sufficient fire power available. (Par. 334 German I. D. R.). The situation in which these thin firing lines are placed is by no means a favorable one, as the defender will concentrate his fire on the points where the assailant seems to be filling up his line "for the purpose of overwhelming the defender permanently by a superiority of fire." (Par. 413 German I. D. R.). The skirmishers will then quite naturally open fire for the purpose of interfering with the cool delivery of the defender's fire.

Such a piecemeal, almost independent advance, during which the effect of the accustomed word of command is considerably reduced and control and supervision of the individual skirmisher is impossible, presupposes that the troops are well-drilled, individually trained, and, above all, intelligent. Attention must also be called to the fact that the firing line can offer but a weak resistance to an enemy advancing unexpectedly in force. But, in spite of these drawbacks, this mode of advance has its advantages for crossing a plain devoid of cover. It permits favorable fire positions to be reached with greater safety, especially if these positions can be picked out with the aid of field glasses, than would be the case if dense skirmish lines were led forward simultaneously.

The advance of the infantry under hostile fire, over open ground, may accordingly be conducted—

1. At a walk, by long rushes made by strong units (by platoons at least), supported by powerful artillery fire or by the fire of a machine gun battery or a detachment of skirmishers posted in a favorable position;

2. By shorter rushes made by smaller units ("proper only when conditions demand it");

3. By crawling, or, in exceptional cases (for example in passing through fields of standing grain), by employing

4. Fire while in motion.

The fire fight at long ranges and near the extreme limit of mid ranges is only a means for the purpose of reaching the decisive battle ranges, and of interfering with the undisturbed delivery of the enemy's fire. Fire must be opened at as late a moment as possible. Our firing line should in any case be strong enough, upon entering the zone of mid ranges, to reply effectively to the enemy's fire. Experience has shown that an assailant who opens fire at "long" ranges rarely reaches short ranges. (See p. 149 supra).

The distances at which the echelons in rear follow the firing line should be less (as laid down in the Italian and Russian regulations) than the distance which separates the firing line of the attacker from that of the defender. The distances may be increased without danger at this stage of the combat, as the decision is not imminent, but on the flanks the supports will have to be brought up closer in order that an unexpected flank attack may be effectively opposed. All parts of the attacking force move—as long as possible at a walk—straight to the front. Subordinate leaders, taking advantage of all available cover, should endeavor to lead the supports skillfully after the firing line. This requires that the ground to be crossed be reconnoitered. As a rule, a movement by the flank upon leaving cover is costlier than an advance by squads or sections over open ground. Long lines make it easier for the hostile artillery to adjust and observe its fire, while, when a greater number of targets of smaller frontage is exposed, this is made more difficult. For this reason, supports are not led forward

as entire units, but, on the contrary, they are broken up, and, under certain circumstances, even disintegrated into smaller units. The units following in rear remain as long as possible in close order formations, preferably in route columns. "Man is by nature exceedingly timid. Soldiers, even those drawn from the educated classes, who were fully aware of the supreme importance of gaining the victory, broke down on coming under fire. In close order the moral encouragement due to the proximity of superiors and comrades kept up their courage." (Hessert).* Where cover is lacking, the supports will also have to be deployed. Large units are broken up into platoons, which deploy and follow each other at considerable distances.†

As soon as the enemy opens fire, platoon commanders must decide whether or not it ought to be returned; but the closer one can get to the enemy without firing a shot, the better. According to the German F. S. R. (par. 296), a prolonged, uninterrupted forward movement of skirmish lines in the open, at less than 1000 m. from the enemy, is possible only when supported by adequate fire. On the other hand, even skirmishers lying down suffer serious losses when 600 m. from the enemy.

Thus, at mid ranges, begins the actual, protracted fire fight, which, in the first place, is to make a further advance possible, and which, subsequently, is to produce a superiority of fire. As taught by experience, this cannot be accomplished from a single position, if the enemy is efficient.

A so-called "main firing position", which was to be located 400—600 m. from the enemy, was frequently used during peace maneuvers for the purpose of bringing cohesion and harmony into the attack. In making use of such a position, the principal difficulty of every serious infantry attack, that of crossing the space lying between the first firing position and the assaulting position, was not appreciated.

*"We are prone to place the individual on too high a pedestal, and, in doing so, to ignore the psychological element of combat." Major-General Stieler.

†The losses sustained during the advance of the Russian reserves at Plevna (11th September, 1877), and during the attack made by the Guard on Gorni Dubniac, led to a spontaneous deployment on the part of the reserves.

Austria. (Par. 589 I. D. R.). "When conditions are very favorable, it might be possible to choose the firing position in which the decisive fire fight is to be begun, so close to the enemy that the decision can be gained from it."

The fire fight must be taken up by enough troops to make it impossible for the defender, who holds his position strongly, to gain a superiority of fire over some parts of the attacking force. The supports will now move closer to the firing line, in order to fill every gap in that line and to meet every attempt of the defender to gain the upper hand. The echelons of the second line which have not as yet been absorbed by the firing line, move up in a similar manner. If the hostile fire abates, parts of the firing line should endeavor to get closer to the enemy; they are followed by the next adjoining units. At this stage of the action the attacker will have to give up, to some extent, his distribution in depth.

Superiority of fire is an essential condition to victory. It is attained by better marksmanship, fire control and fire direction, by taking advantage of cover, and by concentrating a powerful fire against the decisive point. When the attacker's troops are not well trained, a greater number of rifles and more ammunition will be required to gain this superiority. Accordingly, the attacker will either make an envelopment or employ fire of position. The attacker possesses a great advantage, in that he does not need to gain a superiority of fire along the whole front, but only at a single point. It suffices for him to contain weak portions of the hostile front with suitable, well concealed combat groups capable of quickly developing a powerful fire, while he masses the bulk of his forces against the decisive point. The defender, who never knows where the decisive blow is going to fall, ought not to allow himself to be enticed into occupying portions of his line more weakly than the rest.

The attainment of the superiority of fire requires time, and, in addition, coolness and patience on the part of the leaders. All the ammunition that is expended in gaining this superiority is later compensated for by fewer losses. The heavy losses

sustained by the Prussian troops on the slopes of Point du Jour, on August 18th, 1870, may be traced directly to the fact that the leaders did not know how to wait.

Superiority of fire* is absolutely essential to the success of the attack. Any failure to appreciate this principle will lead to such heavy losses that even if the assailant were to reach the enemy's position, he would be too weak to gain the victory.†

During the fluctuating fire fight, which lasts for hours, the attacker will have succeeded in working forward little by little until he is close to the enemy's position. His superiority will now make itself felt; the fire from the part of the hostile line that is to be penetrated will begin to abate; and, at first, single groups, then several, and finally, whole units of the enemy's line will commence to crumble away. The attacker should wait until this effect is produced before he begins the assault; if he does not do this, the attack is sure to fail.

Austria. (Par. 590 I. D. R.). "The close approach of a long firing line to an enemy who occupies a good position, may well pass as a proof of the assailant's superiority. Nevertheless, this does not, under all circumstances, furnish assurance that a forward movement for the purpose of penetrating the hostile position will now succeed; a premature assault may still result in disaster. *As long as the conduct of the opponent does not show clear indications that his fire power is crippled, nothing remains for the attacker but to continue the fight for the superiority of fire.*"

Even in this, mistakes are not precluded. It is far from easy to recognize when the defender of a position has been sufficiently subdued by fire to make an assault feasible, and

*For the situation of the British Guard at Modder River (28th November, 1899), see p. 182 supra. The Guards were closely hugging the ground at a distance of 800 m. from the enemy. After 29 ammunition carriers had been shot at the very beginning of the engagement, all attempts to carry orders or ammunition to the firing line were abandoned. No attempts were made to relieve the pressure by means of the fire of sharpshooters, by bringing up reinforcements, or by gaining ground by crawling.

†"Battles are won by the superiority of fire." FREDERICK THE GREAT in his *Military Testament*, 1768.

when the proper moment has arrived for launching the reserves. It is only necessary to recall the premature advance of the artillery and cavalry over the ravine of the Mance brook, on August 18th, 1870.

The cessation of the defender's fire, in itself, is not a sure sign that his firing line is shaken, as the attacker is unable to distinguish between a fire pause ordered by the commander on the defensive and the forced discontinuance of the fight. Sure indications are not available until men actually leave the defender's fighting line here and there, and attempts of the leaders to hold the wavering ones are clearly apparent.

At this moment, a leader who has resolved to assault, should order bayonets fixed.

The temporary interruption of the fire occasioned by fixing bayonets is of no importance, as the superiority of fire has already been gained. If bayonets are prematurely ordered to be fixed, the accuracy of the fire will soon be impaired, as the firing of rifles, weighted down by the attached bayonets, increases the fatigue of the men. When the troops are excited, the downward deflection of the bullets caused by fixing the bayonet can, however, only produce a good effect. It is best to fix bayonets at the signal "Fix bayonet". In the excitement prevailing at the moment, it will be impossible to execute the order with any uniformity, but it is a good plan, in time of peace, to require one man of each file to fire while the other one fixes his bayonet. The approaching reserves fix bayonets while on the march.

10. THE ASSAULT.

"The assault does not, strictly speaking, belong to the domain of tactics. Rules, showing in what formations and under what conditions the assault should be made in war, cannot be formulated. At any rate, fire tactics are not only an essential factor but also the crowning act of combat; the assault is nothing but the postlude. All modern combats show that the morale of the men suffers most, and that, in consequence thereof, troops deteriorate quickly when they are exposed to the annihilating effect of fire. This lesson was thoroughly learned by the Austrians in 1866, and by the Russians in front of Plevna. Of what avail were 'self-sacrifice', the 'unconquerable determination to gain the victory', the 'desire for hand to hand conflict', and all the other terms that are employed to prove that the moral factors are the decisive ones in war? That they are the decisive factors needs no proof whatever; it follows, as a matter of course, from uniform training, uniform leadership, and uniform arms. But tactics fit for use in war, are to furnish, above all else, ways and means, showing how and by what methods the fighting energy of troops may be preserved most effectively, and thus contribute directly toward preventing the premature deterioration of the morale of the troops."*

"The defeat of the opponent is consummated by the assault with fixed bayonets." (Par. 324 German I. D. R.). A premature advance to the assault, with all the peculiar features attending it, produces an aversion against the attack, an undue extension of battle lines, and makes it impossible for reinforcements to come up, except under cover of darkness.

The decision for making the assault emanates either from the subordinate leaders in the firing line or from the commander of the whole force. The latter may give the im-

*Colonel KEIM in *von Löbells Jahresberichte*, 1899, II, p. 561.

pulse for the assault by launching the reserve. This is undoubtedly the safer procedure. "When the decision to assault emanates from the commanders in rear, notice thereof is given by sounding the signal 'fix bayonet', which must be repeated by all the units that are to take part in the assault. At this signal the skirmishers increase their fire to the utmost. The parts of the firing line which are still in rear, move forward, as quickly as possible, to a position close to the enemy. All reinforcements in rear hasten straight to the front. As soon as the leading line is to form for the assault, all the trumpeters sound the signal 'forward, double time', all the drummers beat their drums, and all parts of the force throw themselves with the greatest determination upon the enemy. It should be a point of honor with skirmishers not to allow the supports to overtake them earlier than the moment of penetrating the enemy's position. When immediately in front of the enemy, the men should charge bayonet and, with a cheer, penetrate the position." (Pars. 346—348 German I. D. R.).

It is very difficult for a superior commander to perceive when the proper moment for making the assault has arrived, as he is compelled to remain so far in rear of the fighting line, especially where large forces are concerned, that he can only follow the general course of the attack. The first indication which he receives as to whether the enemy's fire power has been broken all along the line, is the advance of his own firing line. He will still more rarely be able to see in time when the resistance of the enemy abates at some one point, and it will be quite impossible for him to issue orders with sufficient promptness to turn such an advantage quickly to good account.*

*"The attack fed from the rear, which may be likened to the closing of a telescope, is one of the most peculiar results of constructive theory, which seeks, by this means, to increase the energy of the first line, but only succeeds in massing too many men in front of the enemy, a better condition than which the enemy could not desire." VON MALACHOWSKI, *Scharfe Taktik und Revue-Taktik*, p. 230. Incorrect estimate of the situation by the commander of the Ist Army on August 18th, 1870. F. HÖNIG, *Vierundzwanzig Stunden Moltkescher Strategie*, p. 145. *Der 18. August*, p. 271.

The firing line will, therefore, frequently have to take the initiative in bringing about the assault. It is absolutely necessary, especially if the enemy evacuates the position, that the firing line, quickly taking advantage of this moment, pass over to the bayonet attack. If the firing line were to wait until the reserves are up, valuable time would be lost, under certain circumstances; the enemy might recover from his temporary bewilderment and re-form, or might even receive reinforcements. In addition, hesitation on the part of the attacker would enable the enemy to gain time, evacuate the position unmolested, retire in good order, and perhaps take up a new position, or at least evade quickly the pursuing fire of the assailant. The firing line would be the first, in such a case, to perceive when and where the resistance of the enemy abates; it should therefore make the most of this knowledge and throw itself upon the part of the defender's force that is in the act of withdrawing.

When the impulse for the assault emanates from the firing line, there is danger that instead of a general attack only a local one will result. It is impossible to conceive that the whole firing line will simultaneously consider that the moment for the assault has arrived; in general, only a part of that line at a time will come to this conclusion. Such local attacks are hazardous, however, and have some chance of succeeding only in covered terrain. A local assault made by a single battalion or company will usually attract the fire of a considerable portion of the hostile line and quite naturally dash itself to pieces against it. Even assuming that a gallantly charging unit succeeds in unexpectedly penetrating the hostile line at some one point, the defender will at once attack it in vastly superior force and compel it to retire with heavy loss. Furthermore, the failure is usually not confined to the one unit. The troops on the right and left of it, although they are perhaps farther from the enemy, and have not yet shaken him sufficiently by their fire, nevertheless join in the assault, as soon as they see the first unit rush forward. As a rule,

when the decision to assault emanates from the firing line, a series of unsuccessful assaults will result. These will, however, bring good troops closer and closer to the enemy, until the great moment of definitely gained superiority finally arrives.

The General Staff account of the Franco-German war* very aptly describes the decisive moment for the assault: "The tension of the tactical situation was increased to the highest pitch by the prolonged fight at close range; the time was now ripe for the decision and the German corps commanders issued orders for the assault. Before this order reached the leading line, however, the German general officers on the spot had decided, at about 7:30 P. M., to undertake the assault on their own responsibility, as they considered the attack sufficiently prepared. On the signal given by them, and in many instances of their own accord, the Prussian and Saxon battalions hurled themselves, just as the sun was setting, on the position which had been so long and so tenaciously defended by the enemy." **(St. Privat)**. Consult, *Der 18. August*, pp. 525 and 571.

"When the XIth Army Corps issued from the **Niederwald** (near **Wörth**), the infantry encountered such a heavy fire from the direction of **Elsasshausen** that the troops had to choose between either advancing farther or giving up the advantages that had been gained at such great sacrifices. The former course was indeed open to objection, as the troops were exhausted, as organizations were in confusion from the fighting they had just gone through, and as only three formed and fresh battalions were available."—"General von Bose now ordered a general attack. At the signal 'the whole force will advance', the firing lines rushed from the Niederwald and, with loud cheers, threw themselves upon the enemy."†

The assault was thus not a result of the superiority that had been gained, but an act of desperation in a situation that had become unbearable. Moreover, the success of the assault was not due to any numerical superiority of the attacker, but to the lack of initiative of the defender, and to the fact that he confined himself to purely defensive action.

It is, therefore, after all, an open question whether the initiative of parts of the line should govern the conduct of the entire force. In some instances, it certainly ought not to govern, if disaster is to be avoided. When a portion of the firing line advances, however, and the tactical situation in any way permits, neighboring units should at once conform to the movement. The units in rear, in particular, should, in this

*Gen. St. W., II, p. 890.

†Gen. St. W., I, p. 267.

case, promptly hurry forward by the shortest route without regard to losses, support the firing line, and prevent it being repulsed. (Par. 345, German I. D. R.).

This brings up the question, as to whether the trumpeters of the assaulting units should sound the signal "fix bayonet," in this assault, and thus bring about a prompt general assault by the entire line. This might obviously cause the troops to advance prematurely to the assault, a danger which might be brought about by the junior platoon commander. No one but the supreme commander, therefore, has the right to order this signal to be sounded when he wishes a general assault to be made. This is prescribed in the German Infantry Drill Regulations (par. 347). If the commander of the firing line decides to assault, he transmits his decision to the rear by means of signals (s. s. s.). The supreme commander can still restrain the skirmishers by the signal h. h. h., or bring about a general assault all along the line by giving the signal "fix bayonet". If a unit moves to the assault contrary to the wishes of the supreme commander, he should possess enough nerve to look on calmly while it is being defeated. It is much better for him to allow a single unit to be defeated than to cause the failure of the general attack by a premature advance.

"Although the assault should be made as nearly simultaneously as possible, this is not to be understood as meaning that all the units should penetrate the hostile position at one and the same time. Such simultaneous action is immaterial, and might, indeed, cause parts of the line who had a chance of successfully carrying out the assault, to hesitate because others are still in rear. The power of the attack would accordingly be impaired. All units that have once started must continue to advance uninterruptedly." (Par. 349 German I. D. R.).

It depends upon the situation whether the troops intended for the holding attack finally participate in the assault itself. If they can bring an effective fire to bear upon the point of

attack from an oblique direction and thereby ensure the success of the attack, they should make the most of this advantage. (Par. 340 German I. D. R.).

When the enemy advances to the frontal counter-attack, as laid down in the Russian and British regulations, the skirmishers throw themselves down for the purpose of firing. The supports in the act of moving up continue their march. If the enemy faces about, all the troops press after him.

The French regulations (par. 270) also consider such a counter-attack:

"If the attacker presses forward too hastily and if he threatens to carry the defender's position, fresh troops, which have been assembled in a place sheltered from view, attack him energetically, while the troops already engaged increase the intensity of their fire. This powerful and energetic counter-attack produces confusion in the enemy's ranks and compels him to retire, or at least to discontinue his forward movement until he has had time to recover.....The troops in the counter-attack should move forward without hesitation and regardless of the cost. When such a forward movement has to be discontinued, the commander must decide where it shall cease. The efforts of all should be directed toward one object, that of tiring and demoralizing the enemy by constant counter-attacks, until the moment arrives when the commander must order the offensive to be assumed."

The German Infantry Drill Regulations contain no further rules for the conduct of the assault. If the physical and moral power of the enemy is so broken by the preceding fire fight that he commences to evacuate his position, it is quite immaterial what sort of an assault is made; the men simply fire and rush quickly after the retiring enemy. In this case the assault is nothing but a postlude of the fire fight.

A brave and well disciplined opponent who is energetically led, will not allow himself to be forced to evacuate his position by fire alone; to compel him to evacuate his position will at the very least require that an assault be threatened.

Before the Boer war, the British held the view that the effect of the fire fight alone was so great that the assault would strike nothing but an evacuated or, at most, a feebly defended position. The assault was to commence after the enemy had

ceased firing and had sought protection in his trenches. The following statement is made by one who fought on the Boer side:

"The artillery supported the advance until the latter had arrived within 300 or 400 m. of the enemy; then it ceased firing. After a brief period of preparation by fire, the British infantry began the assault simultaneously in one long line. This assault, made without fire support, was repulsed without trouble by the Boer fire. On several occasions, short lines of our opponent had begun to advance, but these were in every instance forced to throw themselves down after a few moments had elapsed. Thereupon the whole British line, in my estimation at least 300—400 men strong, began to advance. One could clearly hear the British leaders call to their men to cease firing, could clearly hear the command 'fix bayonet', and the cheer 'God save the Queen'! run along the British line. Then the whole hostile line rose. As they rushed toward us, they looked to me like a grayish yellow swarm, the men being almost shoulder to shoulder and the line being in places three to four men deep, just as frequently happens in charges made during our own peace maneuvers. At the same moment, we began firing. Our fire was at first somewhat wild, but was soon better controlled by our more experienced fighters calling, 'Steady boys, steady, then none of them will reach us'. More and more men fell in the British line, and, when it had arrived within 100 or 80 paces of our position, its energy had spent itself. A part of the men threw themselves down behind boulders and fired, while the majority rushed back to the shelter of some bushes; but even there it was for the most part impossible to hold them. An assaulting enemy who does not fire, is not dangerous, even if he is numerically superior. In this case, the defender can fire a number of times, and the closer the assailant is to the defender's position the more quickly and certainly will his force dwindle away. No one will, however, be able to induce the same men to advance again under hostile fire over an open field, that is, to expose themselves without shelter to the hostile fire."*

The same lesson was learned long ago at **Gorni Dubniac** and at **Plevna.**

It is obvious that fire support is essential to the success of such an assault. This should be furnished in the first place by the artillery. In furnishing this support, artillery can employ time fire only until the infantry arrives within 300 m. of the enemy, while percussion fire may be continued until the infantry arrives within 150 m. of the enemy. During the

*Supplement 8 to the *Militär-Wochenblatt*, 1901.

attack on Pieters Hill (1900), Colonel Kitchener is said to have told his artillerymen that he would not censure them if two or three of their shrapnel burst in the ranks of his infantry. The following statement appears in a British memorial on the lessons of the war in the Far East: "The moral effect produced by artillery fire, which forced the defenders to take to cover and did not even permit them to raise their heads above the parapet, was so highly esteemed by the Japanese infantry that it requested the batteries to continue firing, without regard to the losses thereby inflicted in its own ranks, until it had taken the position or unfurled small national flags as an indication that fire support was no longer necessary. According to the opinion of the Japanese themselves, the losses inflicted in their infantry by their own guns were insignificant in comparison to the losses which the defender could inflict by delivering his fire undisturbed at a range of a few hundred meters, when not kept down by the attacking artillery." According to the Austrian regulations, one unit is to remain halted for the purpose of directing its fire upon the point of attack or upon any reserves that might appear. This provision involves a grave danger, in that it may induce the leader to retain a considerable number of troops in rallying positions, instead of launching his whole force in the assault.

When fire support is deemed necessary in an attack, the artillery will perhaps be best able to furnish it until the infantry has reached a certain point. Then a moment will arrive, however, when the guns will have to cease firing, and when even the infantry units which have been left behind to support the attack, will no longer be able to direct their fire upon the enemy on account of the wide frontage of the assaulting force. The defender's troops would have to be poor indeed, if they would not at this moment, when the assailant's fire has practically ceased, raise their heads above the parapet for the purpose of emptying their magazines once more at the assailant, even though the fire be unaimed.

If the assault is to succeed, it is essential however, that, while the attacker covers the last 100—150 m., the defender be compelled to keep under cover. *This can only be accomplished by employing fire while in motion.*

This fire is practicable because the defender, who has been overwhelmed in the fire fight, has sought shelter in his works; it is advantageous, as it is only to compel the enemy to keep under cover. It would unquestionably be a mistake, and not justifiable in any case, to employ fire while in motion, when these conditions are not fulfilled, when the enemy is not completely subdued and is perhaps waiting under cover, ready to meet the assailant's assault. Supporting the infantry assault with fire has, moreover, the additional advantage of preventing the defender from bringing up his reserves.

The following is taken from a private letter of Sir Ian Hamilton, perhaps the foremost British infantry tactician, who had the good fortune, at Elandslaagte and Doornkop, of leading his command close up to the enemy: "It is my opinion that no matter what regulations are promulgated in time of peace, the men will fire during the assault. You may rest assured that nothing will prevent their doing this. One would do well, therefore, to reckon with this factor from the very start. The greatest danger is always that the men will throw themselves down instead of continuing the advance. And, if the men have once thrown themselves down during the assault, they will rise only for the purpose of retreating."*

Russia. The attacking force approaches the enemy so close (35 m.) that the troops are enabled to throw themselves upon him. The point at which the hostile position is to be penetrated is designated and the men form in rear of their platoon leader. The reserves move at a run or by

*In *Ausbildung der Infanterie für den Angriff*, p. 63, Colonel VON DER GOLTZ makes the following statement in regard to an experiment: "As the line gradually drew closer to the defender's position, the desire of the individual men to get into the hostile position as quickly as possible, became more and more apparent; the prone position for firing was abandoned for the kneeling position, finally for the standing position, and, quite naturally, fire while in motion resulted in the end. Fire while in motion is authorized by the regulations and is, in this case, certainly permissible. Its employment in this case may be traced to the very proper desire of not allowing the enemy, who has been held down this long, to raise himself above his parapet. This fire while in motion should not be confused with the fire while in motion formerly employed by long skirmish lines at long ranges, and condemned at that time. The latter had for its object not the keeping down of an enemy already overwhelmed, but, on the contrary, was intended to overpower an unshaken opponent."

crawling close up to the firing line. If the assault is begun at a greater distance than 35 m. from the hostile position, fire while in motion is employed, "in order that the enemy may not regain his senses and may be prevented from rising above his parapet."

During an unexpected encounter at night, on unfavorable terrain (Swiep-Wald at Königgrätz), as well as during obstinate fights for the possession of fortifications (the Grivica Work at Plevna, Scheinovo), bayonet combats are unavoidable, provided both forces are equally determined. During the fight for the possession of Servigny, on the evening of August 31st, 1870, serious hand to hand fighting occurred in the narrow village streets.* The Russo-Japanese war also proved beyond the shadow of a doubt that determined troops will maintain their positions until they are thrown out of them by cold steel.†

The defender will never retire simultaneously all along the line; frequently isolated groups and then entire units will leave his line when the superiority of the attacker's fire becomes effective. Officers, non-commissioned officers and capable privates will endeavor to keep the weak-kneed from running away.‡

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*KUNZ, *Noisseville,* p. 51. See p. 134 supra. Fieldmarshal MOLTKE makes the following observations in regard to the bayonet fights of the campaign of 1859: "General Niel credits his victory at Solferino to the use of the bayonet. The question as to how often the advance to hand to hand conflict is carried out, may be left open. As a rule, it is employed only when it may be presumed that the enemy will not await the onslaught." In his memoranda of 1865, in regard to the influence of improved fire arms on tactics, he states: "If the bayonet fights, so often mentioned in French accounts of the campaign of 1859, were stripped of their dramatic splendor, and if the simple prosaic truth could be ascertained, by far the greater number of these reports would be corrected in so far as to state that the opponent, shaken by more or less heavy losses, avoided the actual collision."

†Examples: The attack on Tempel Hill on October 11th, in *Angriffsverfahren der Japaner,* VON LÜTTWITZ.—The capture of works No. 17 and No. 18 by the 2nd Division, on March 1st, 1905 (Mukden).—Description by an eyewitness of a bayonet fight. Sir IAN HAMILTON, *A Staff Officer's Scrap Book,* p. 252.—A bayonet fight occurred in the day time, in the open, when the 11th Rifle Regiment broke through the line at Hamatan during the battle on the Yalu, (see *Kriegsgeschichtliche Einzelschriften,* 39-40, p. 131), and in Bernaul's Regiment, during the engagement at Datshishiao, on July 24th, 1904.

‡At Villepion, Captain von Hoffmann made a wavering section hold its position by springing toward them, revolver in hand, and yelling: "I'll shoot the first man who gets up! my revolver will hit too, whether Chassepot bullets will hit you is a question." *Geschichte des Bayerischen Leibregiments.*

If the assault is not made at this moment, the crisis may pass, but a determined rush by the attacker will, as a rule, bring about the decision. The threat of a bayonet attack usually decides those who have remained in the position, to make no further resistance. The attacker must make use of the moral factors in an assault, hence the importance of running, cheering, and accompanying the advance of all bodies in close order by the beating of drums and the sounding of trumpets.*

"The French were unable to withstand an energetic attack, when undertaken in anything like sufficient strength and accompanied by cheers and beating drums." BOGUSLAWSKI.

"Suddenly some soldier shouted: 'Columns! Columns!' Captain von Wobeser rose to see what was going on, but at the same moment his men rushed back and made straight for the Bois."—"The mere launching of the attack from the direction of **Point du Jour** sufficed to induce the well concealed force of about 400 men, which held the gravel pits, likewise to beat a retreat that very much resembled a rout." HÖNIG.

In time of peace there should be instilled in the soldier the conviction that, with the bayonet, he is a match for any opponent; that, in bayonet fighting, no other infantry is the equal of his own. The soldier should not be taught to shrink from the bayonet attack, but to seek it. If the infantry is deprived of the *arme blanche,* if the impossibility of bayonet fighting is preached, and the soldier is never given an opportunity in time of peace of defending himself, man to man, with his weapon in bayonet fencing, an infantry will be developed, which is unsuitable for attack and which, moreover, lacks a most essential quality, viz., the moral power to reach the enemy's position.

"The rarity of bayonet fights does not prove the uselessness of the bayonet, but shows that opponents will rarely be found who are equally capable of making use of it. Indeed, the bayonet cannot be abolished for the reason, if for no other, that it is the sole and exclusive embodiment of that will power which alone, both in war and in every-day life, attains its

*One must read KUNZ, *Kriegsgeschichtliche Beispiele,* 13, pp. 80, 116, 123 and 156, in order to appreciate what an electrifying influence the beating of drums may have even on retreating lines.

object, whereas reason only tends to facilitate the attainment of the object.

"Let us assume that there exists an army which bases success in battle on fire action, and takes for granted that the enemy will not be able to get near enough to make a bayonet attack. If this army were to encounter another army which, without undervaluing the effect of fire, remembers the bayonet at the proper time, it would be filled with the most dreadful dismay when the enemy actually assails it with the bayonet. With modern rifles, bullets are unquestionably a good substitute for the bayonet at close quarters, but this is true only of troops who do not fear annihilation, *i.e.,* troops trained to use the bayonet and capable of closing with the enemy after firing. If this is not the case, such firing at close quarters is a pure waste of ammunition, since men who are afraid to close with the enemy, if necessary at such a moment, will usually fire into the air.

"If the soldier has been taught, however, to annihilate the enemy from a distance and from behind cover, he will naturally prefer this mode of inflicting losses, since he runs very little risk of getting hurt, and will, moreover, acquire an aversion for exposing himself to danger, *i.e.,* he will shrink from bayonet work. Hence, if we attach too much importance to marksmanship, we produce a more or less trained soldier, who may possibly be a very good shot at long ranges, but who is not especially inclined to take his chances in a bayonet fight. Incidentally, target practice develops the mentality of the man, but does not improve his morale." DRAGOMIROV.

Of every 100 wounds, the following percentages were produced by cutting weapons:

Campaign of 1859	1.67%
Campaign of 1864	4.0 %
Campaign of 1866 (Prussians)	5.4 %
St. Privat (Germans)	1.0 %
Russo-Turkish war	0.9 %

In time of peace the assaulting distance is to be about 150 m. During the Franco-German war, the assault against Elsaszhausen (battle of Wörth) was launched at about 300 m.* and that against St. Hubert at 100—200 m. from the enemy.† The 107th Infantry, after charging over a distance of more than 500 paces, captured a hedge which was held by the French north of St. Privat, and, in the assault against the northern outskirts of the village, a distance of 300 paces had to be covered.‡ In the attack on Le Bourget, on October 30th, 1870, the center column halted when 600 m. from the village; "then began a wild, headlong assault against its outskirts."¶ The Japanese frequently had occasion to cross similar stretches at a run, but there were also instances where their assaulting troops had only to cover a few meters (1st Division at Kinchau, 20 m.).

If the attacker succeeds in carrying the position, he will be at a disadvantage for the moment; his troops will be in confusion and exhausted, and a large number of officers will be gone. If the defender, reinforced by fresh reserves, takes advantage of this moment, he may be able to turn the tide of the battle. The inclination of the men to pursue the enemy with the bayonet, instead of halting and making the most of the fire power of their rifles, is noticeable in all battles. The attacker will have to take steps to restrain his victorious infantry, and, as soon as opportunity offers, to pursue the enemy with fire. Under cover of this fire fresh troops or quickly assembled detachments should advance on the flanks in pursuit of the enemy. There is a wide difference between a wild, headlong rush after the enemy and a systematic pursuit. Infantry that rushes headlong to the front after penetrating a position must be brought back at any cost, unless it can enter a second position simultaneously with the enemy.§

Gen. St. W., I, p. 267.

†HÖNIG, *Vierundzwanzig Stunden Moltkescher Strategie*, p. 127.

‡*Gen. St. W.*, II, p. 804.

¶KUNZ, *Le Bourget*, p. 21.

§The conduct of the 47th Infantry Brigade after the capture of Ste. Marie aux Chênes. *Der 18. August*, p. 184. The second line of the position at Düppel was carried by the pursuing victors at the first rush. *Gen. St. W.*, 1864, II, p. 539.

In addition to pursuing the enemy with fire, the attacker should re-form his troops without regard to their original arrangement (if the enemy gives him time enough, the original organizations should be re-formed), occupy the position, replenish ammunition, and remove the prisoners. It is a mistake to mass more rifles in the captured position than can be employed to advantage, as the enemy will in all probability direct a heavy fire upon it. As soon as the fight has been decided, the echelons in rear should be halted, so that they can be employed as occasion demands. The leaders of these units will often have to act independently in such a case. (Par. 350 German I. D. R.). Preparations should be made to the end that hostile counter-attacks may be at once repulsed. These rules are particularly important when the position that has been carried is not the main position but only an advanced post.* These measures must be taken independently by all leaders who participated in the assault, without waiting for orders from superior authority. The pursuit should be begun as soon as possible with formed bodies of troops (if practicable, while the enemy is being pursued by fire), in order to interfere with his re-forming, to prevent his taking up route column, and to overrun his rallying positions. The battle of Beaumont consisted of a whole series of such pursuing actions. The arrival of night should by no means be used as an excuse for discontinuing the pursuit, for night above all else is the mightiest ally of a bold victor.†

If the attack fails, it will be the duty of the commander to arrest the flight of the skirmishers who are rushing to the rear under hostile fire. It will be impossible, however, to halt

*See *Taktik*, V, p. 359, et seq. See also the measures taken after the capture of St. Privat. *Der 18. August*, p. 533. The situation in Fröschweiler; KUNZ, *Kriegsgeschichtliche Beispiele*, 17, pp. 109 and 153. As in peace, the signals, 'the whole force assemble,' and 'the whole force halt,' was sounded everywhere. How little the infantry was inclined to pursue is shown by the conduct of the 94th and the 32nd Infantry Regiments. Ibid., pp. 87-90. The 10th Company of the 32nd Infantry marched fully two miles to the rear to a bivouac which they had left in the morning.

†See *Taktik*, V, p. 436.

these men while they are exposed to the most effective fire of the enemy. Only when the nearest cover is reached can there be any question of halting. (Par. 327 German I. D. R.). When cover is not available near at hand, the exhaustion of the troops will soon stop the flight, or the leaders may be able to face them again to the front, as soon as the hostile fire abates. However, the retreating troops will have placed quite a distance between themselves and the enemy before this can be done, and the latter, unmolested by fire from the attacker, will be able to take full advantage of the technical qualities of his rifle, unless the attacker's artillery or cavalry prevent his doing so. No matter where the retreating troops come to a halt and face to the front, there they must stay, and, if the hostile fire permits, intrench.

The perseverance of the Prussian Guard 600—800 m. in front of **St. Privat,*** and of the British Brigade of Highlanders at **Magersfontain,** immediately in front of the Boer position, on December 11th, 1899, is worthy of imitation.

The assault on **Gorni Dubniac** came to a standstill at very short range, and a part of the skirmishers of the Moscow and Pavlov Regiments maintained their positions 50 m., the remaining Russian skirmishers 320 m., from the trench.†

11. THE USE OF THE SPADE IN ATTACK.

(Pars. 157, 313, 339, 380 and 381 German I. D. R.).

In every attack there are situations in which it may be advantageous to use intrenching tools—

1. In fortifying rallying positions.

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*The distance at which the first attack came to a standstill is variously given as 300 (3rd Guard Regiment and IInd Battalion of the 1st Guard Regiment) and 800—900 paces (2nd Guard Regiment). See *History of the 3rd Guard Regiment,* pp. 276, 279 and 280; that of the *1st Guard Regiment,* p. 165; that of the *2nd Guard Regiment,* p. 232. "Headed by a few of the officers who still remained, the depleted lines clung to the slope; with iron endurance and self-sacrifice they maintained the dearly bought positions." *Gen. St. W.,* II, p. 872.

†PUSYREWSKI, *Die russische Garde,* p. 126.

The Japanese, whose mode of waging war was very cautious, fortified the initial positions from which their attacks were made, in order that they might have rallying positions in case of defeat.*

2. In intrenching after making an advance under cover of darkness to within effective range of the enemy for the purpose of opening fire at daybreak. In this case, the advancing force is, as a rule, instructed to advance until it comes under hostile fire and then to intrench.†

3. In intrenching an echelon posted to cover advancing infantry.

4. In fortifying a captured position. The want of intrenching tools in quickly putting captured positions in a state of defense, so often felt during the Franco-German war and the Russo-Turkish war, has now been removed by the introduction of portable tools.‡ The necessity of quickly pre-

*On July 19th, 1904, the 12th Infantry Division (Ist Army) had pushed back Russian troops at Shaotao and at once fortified a position 2700 m. from the new Russian position at Yushuling. From this position the 12th Division advanced, on July 31st, as a Russian attack had not taken place. The extended fortifications facing the Russian Shaho position were made with the same end in view. The war in the Far East was one of positions, since neither army possessed sufficient freedom of action. See p. 341, et seq, supra.

†During the attack on Paardeberg, on February 27th, 1900, the Canadians were ordered to advance before daybreak from their trenches located 500 m. from the Boer position, and to throw themselves down and to intrench as soon as they were fired upon. This was done when the force was 100 m. from the enemy. *Kriegsgeschichtliche Einzelschriften*, 33, p. 60.

The Japanese 45th Infantry, in its advance under cover of darkness against Oerrshikiatsi (Shaho) was first fired upon at a range of 1000 m., whereupon the men threw themselves down and intrenched; when the hostile fire abated, the regiment advanced again, and when the enemy resumed his fire, it intrenched. A third advance brought the regiment within 500 m. of the defender's position and it was able to make the assault during the forenoon of October 12th, 1904.

‡Examples: The French in St. Privat. The Germans and later the French in Noisseville, on September 1st, 1870. Villepion, on December 1st, 1870 (HÖNIG, *Volkskrieg*, III, p. 257; KUNZ, *Loigny*, p. 49); Les Granges, on January 11th, 1871 (*Geschichte des Regiments Nr. 20*, p. 297). Fortifying the position on the second ridge of the Green Hills in front of Plevna, on September 10th, 1877 (KUROPATKIN-KRAHMER, II, p. 178). Tempel Hill (Terrayama), on October 11th, 1904. In the last mentioned case three offensive returns were repulsed from the captured position, which had been prepared for defense. The fights for the possession of the village of Linchinpu (on the right bank of the Shaho, north of the railway), captured on October 14th, were still more obstinate; the position had to be prepared for defense under hostile artillery fire. (VON TETTAU, *Achtzehn Monate mit Russlands Heeren in der Mandschurei*, II, p. 136).

paring captured positions for defense presented itself in a number of instances.

5. In holding ground that has been gained in an attack when further advance is impossible, that is, in situations such as confronted the infantry of the Guard on August 18th when its first attack came to a standstill. During the attack on Gorni Dubniac, in the Russo-Turkish war, the Russian Guard intrenched when a further advance became impossible. During the attack on Telish, which occurred a few days later, specific orders were issued for the troops to intrench when 1000—2000 m. from the Turkish works.*

As a result of the lessons gained in the Russo-Turkish war, general instructions were issued to the Russian infantry on the subject of intrenching in attack. According to these instructions, the spade was to be used in attack in the following cases: In fortifying a captured position, as a protection against a possible offensive return of the defender; in holding supporting points necessary to a continuation of the attack; and in placing rallying positions in a state of defense. The order directing troops to intrench was to be given, in all cases, by the supreme commander. The following procedure was to be observed: "Every man equipped with a spade and who is not sheltered by some feature of the terrain, places his rifle on the ground and, lying on his left side, begins to excavate a hole parallel to his body. This hole should be as long as the distance from his left elbow to his knee, as wide as the length of the spade-handle, and as deep as the width of the blade of the spade. The excavated earth and sod he places in front of his head, which he endeavors to protect as quickly as possible. When this work is completed, he rolls over into the excavated hole, and, lying on his right side, repeats the operation. When he has obtained sufficient cover, he hands his spade to the other man of the file, who proceeds in a similar fashion."

The Japanese, on account of their numerical inferiority,

*PUSYREWSKI, *Die russische Garde*, p. 166.

found it necessary to get along with few supports and reserves, and therefore made use of the spade in terrain devoid of cover, or utilized sand bags,* which were carried along. In this manner, they laboriously worked their way to within assaulting distance of the enemy. In many instances, this necessitated whole days of fighting when an envelopment was impossible. Sand bags were an advantage when the ground was frozen or when the sod was not thick.

Results of Russian experiments. The sand bag employed was made of coarse linen of grayish green color and when filled and tied, was approximately 50 cm. long (width of a man's shoulders), 30—35 cm. wide, and 30—35 cm. high. The filled sand bag weighed 14—20 kg., depending upon the filling material (sand or broken stone). When filled with sand or broken stone, the sand bag stopped all projectiles, while, when filled with earth, even two bags placed in rear of each other did not afford sufficient protection. The sand bags were scarcely discernible with the naked eye at 400 m. They were not an easy target to hit, and, even at 300 m., it was difficult to aim at them.

The men had a distinct aversion against constructing shelter trenches while lying down. During the war they could be made to intrench only by great exertions on the part of the officers. The reason for this is obvious; digging with the small spade while in a prone position is uncomfortable. The skirmisher considers it much more profitable to fire than to puzzle out how he can best stir up the soil with the small spade while in a prone position. Moreover, he knows that at any moment he may have to make a rush to the front.

The beautiful idea that these trenches were to be used and widened by the reserves, was usually not carried out. The reserves preferred to make longer rushes and to take advantage of folds of the ground rather than occupy themselves with intrenching under hostile fire.

At ranges from 2000—1000 m., single men made short rushes, only 30—40 m. long, as the filled sand bag constituted a considerable load. Before a man ran forward, he slung his rifle, grasped the sand bag with one hand at the tied end, with the other at a loop specially provided for that purpose; then he jumped up, ran forward 30—40 m., as rapidly as he could in a crouching position, placed the sand bag on the ground, and threw himself down behind it. Under effective hostile fire, at 1000—550 m. (during our peace maneuvers at 420—280 m.), the men then crawl

*See p. 344 supra. Frequently the bags, which could be tied with a string, were filled near the place where they were to be used. The advance was considerably retarded by carrying along sand bags. During the attack on Yuputz, on March 1st, 1905, by the 8th Infantry Division of the IInd Army, the first sand bag cover was constructed 700 m. and the last 250 m. from the village.

forward, utilizing the sand bag as cover. The men would rather crawl a greater distance with the sand bag than intrench while lying down.

From the position of the enemy, the skirmishers lying behind grayish green sand bags could not be recognized with the naked eye at 2000—1000 m. It is reported that both officers and men were at first very much disinclined toward making these experiments, but that they changed their views after one or two exercises, and the principal apprehension, that of increasing the weight of the field equipment, disappeared because of the undeniable advantages of the sand bag.

Such cover constructed by the assailant has no greater value than natural cover found on the ground over which the attack is made; it affords protection during halts and induces retreating skirmishers to face to the front again at an earlier moment than would otherwise be the case.

"It should not be forgotten, however, that time gained is of greater benefit to the defender than to the assailant. Moreover, the great difficulty of inducing a firing line which has made a lodgment under hostile fire, to advance from its laboriously constructed cover, admonishes us to be cautious in employing the spade during an attack. The construction of cover ought never to impair the desire for making an impetuous attack, or destroy the offensive spirit." (Par. 313 German I. D. R.).

When a body of troops intrenches during an attack, it must detach half of its force to keep up the attack; this cannot be offset by an increased rate of fire, even if squad leaders, range finders, and musicians, take part in the fight, as the men offer a taller target while intrenching, and as the newly turned earth facilitates the enemy's aim. A superiority of fire that has been gained may thereby be lost. However, when the defender's troops have been so shaken that the assailant can detach half of his rifles with impunity, the latter need not remain lying on the ground, but can advance, in most cases, closer to the enemy's position. The use of the spade is, therefore, proper only when ground that has been gained is to be held, and when the enemy's fire permits intrenching.

Russia. In instructions issued by General Kuropatkin, the following statement in regard to the Japanese infantry appears: "It advances in widely deployed lines. The firing line advances by short, alternating rushes, the men then throwing themselves down and intrenching. In spite of our extraordinarily violent fire, the firing line continues to advance by alternate rushes, leaves its half completed shelter trenches and begins to dig new ones. The supports then advance by alternate rushes, occupy the first line of trenches and complete them. When the firing line advances from the second line of trenches, they are occupied by the supports, while the reserves move up into the first line of trenches. In this manner, the advance is continued by successive rushes. From this, it is apparent that the infantryman in the firing line must act on his own initiative in selecting a point for intrenching."

Japan. In a number of cases, the Japanese conducted an attack in the manner described. At Liao Yang, on September 1st, 1904, shelter trenches were dug at 750 and at 530 m. from the Russian position. The advance beyond this was so managed that the men intrenched after every rush, finally arriving, in the course of the day, within 300 m. of the enemy. An assault made from this position on the afternoon of the 2nd was repulsed. The whole Japanese line again faced to the front on arriving in the shelter trenches which they had dug 300 m. from the hostile position. The Japanese now perfected their weak intrenchments and were even able to repulse two counter-attacks made by the Russians. This was certainly an exceptional case, and, besides, it involved an attack on a fortified position.

The German Manual of Field Engineering (No. 46) recommends that the man, when lying on his left side, construct in the first place a parapet 30 cm. high, as head cover and rifle rest. This produces pits 50 cm. wide, 60 cm. long, and 40 cm. deep, usually deeper in front than in rear, which makes aiming uncomfortable.

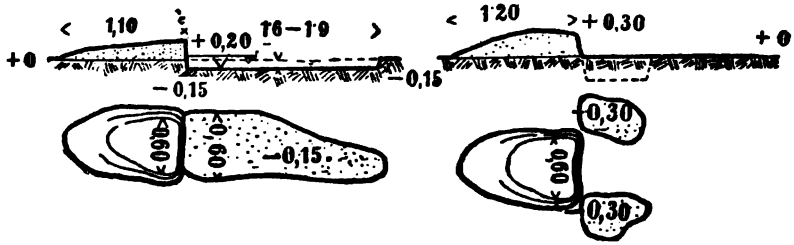
France. According to the *Instruction pratique sur les travaux de campagne* (24th October, 1906), the men are to improve available cover; where natural cover is wanting, artificial cover is to be constructed when the hostile fire compels a halt or the men are forced to halt to regain their breath. At short ranges, the skirmishers dig individual pits. It is desirable for the soldier to use his knapsack as cover while working, and to leave it in position later also, to get better head cover.

England. Although the troops are not equipped with portable intrenching tools, it is prescribed that captured positions be fortified; in open country, when the hostile fire is too hot, this is to be done at night.

The suggestion of creating cover for skirmishers by using the pits produced by short shell salvos, is a singular one. Detailed experiments have been made in **Austria.*** In instructions issued by the commander

*Streffleur, 1906, III, p. 387.

of the XIth Corps, it was recommended that, when exposed to moderate hostile fire, the soldier should hug the ground as closely as possible while at work. The intrenching proceeded most rapidly when the soldier first excavated the ground in front and threw it forward. But in order to do this, the man has to push himself backward during the work and must throw the earth some distance. The parapet is low, but affords sufficient protection.



The task is greater when the soldier lies first on his left, then on his right side, removes earth from a borrow pit at his right and then from one on his left, and piles it up in front. As the skirmisher lies on the natural surface of the ground during this operation, he naturally constructs a higher parapet.

The following general rules governing the use of the spade in attack may be laid down:

1. An invariable use of the spade in attack must be unhesitatingly condemned. The best means of gaining the superiority of fire, and the best protection against hostile fire, is our own fire.

2. It must not be left to the soldier's discretion, as to whether or not he shall intrench. The order for intrenching should in every case emanate from the supreme commander.

3. As a rule, the spade should be used in those phases of combat that partake more of a defensive character, in particular—

(a) To protect artillery and prepare rallying positions during the preparatory stage of the action;

(b) To shelter troops detailed to contain the enemy while enveloping movements are in progress;

(c) To shelter troops that are to keep down the hostile fire by their own delivered from enfilading or commanding positions;

(d) To maintain a strip of ground or a supporting point that has just been gained, whether this has been captured from the enemy or whether the attack has come to a standstill at that point and a pause in the fighting occurs.

4. An attack with the aid of the spade from trench to trench is advisable only in exceptional cases, when the attack is a purely frontal one and is made over ground devoid of cover.

12. THE EMPLOYMENT OF RESERVES.*

(Pars. 294, 295, 366, 388, 393, 427 and 436 German I. D. R.).

The infantry attack may be characterized as a fire fight. It would seem desirable to surround the enemy's zone of approach, or the position one wishes to attack, from the very outset with a dense, continuous line of rifles, and to overcome the resistance of the enemy in the earliest phases of the combat by means of an overwhelming volume of fire from as many rifles as possible. The impediments that stand in the way of carrying out this idea lie in the terrain, the ignorance of the enemy's position, and in human nature. The defender can be driven from his position only by an attack; the impulse for an advance must be given by fresh troops; and the success gained by the firing line must be clinched by a retained assaulting force. The necessity of having a formed body of troops available, until the fight is in full swing, to meet unforeseen contingencies, further requires that a reserve be provided. Organizations should not be broken up any more than is absolutely necessary. The number of troops which the commander will retain for the time being, will depend upon the amount of

*_Taktik_, V, p. 334, et seq.

information he has in regard to the situation. During an attack the reserve is frequently not designated until a preparatory position is taken up. In attack about 1/4—1/3, and in defense 1/6—1/2 of the whole force is put in the reserve, depending upon whether the ensuing action is to be a purely defensive one or the decision is sought.

The reserve enables the commander to "shift the center of gravity of the fight to the point desired by him, to reinforce his line where he considers proper, to equalize fluctuations of the combat, and, finally, to bring about the decision." (Par. 294 German I. D. R.). As the combat progresses, the commander must decide whether the situation is such as to compel him to employ the reserves to cover his retreat,* or whether it is proper for him to put in his last troops for the purpose of gaining the victory. If the reserve has been put in and the attack fails (or, as at Wörth, the defender succumbs after putting in all the reserves) defeat is certain; but it would be a mistake not to employ the reserve, to keep it in readiness to cover a possible retreat, if its intervention can yet bring about a favorable termination of the combat.

The employment of the reserves by the Russians at **Plevna,** on September 11th, 1877: The general reserve consisted of nine battalions and was too weak to make an impression at one point; fifteen battalions were detailed to cover the lines of communication and the artillery (which was not at all in danger). Forty battalions that did not enter the fight were scattered all over the battlefield, no one being able to account for their presence.† When Skobeleff had effected a lodgment in the Turkish position, every available man should have been sent to this point. Although there were 9 battalions, 30 guns, and 4 troops (*Eskadrons*) available, only the Schuja Regiment (1300 men), which had suffered heavy losses in previous actions, was despatched to the point in question, and that more for the purpose of covering the retreat than to make the most of the success that had been gained.

In contrast to the Japanese commanders, who promptly launched all their troops, the Russian commanders were inclined to despatch numerous detachments, to organize provisional units, while completely ignoring ex-

*See deliberations of General v. d. Tann at Coulmiers. HELWIG, *Das erste bayerische Armeekorps*, p. 203.

†In the Franco-German war, the same thing happened on the German side. *Der 18. August*, p. 221.

isting organizations (this had, indeed, also the advantage that a suitable leader could be found for carrying a special mission into execution), and to form strong reserves by details from any and all imaginable units. These reserves were frequently not used at all.*

On March 5th, 1905, the commanding general of the Xth Army Corps (Zerpitzki) had available one brigade of his 31st Division, one regiment of his 9th Division, one regiment of the VIIIth Corps, three Rifle regiments of the mixed Rifle Corps, the 5th Rifle Brigade, and one regiment of the Vth Siberian Army Corps.†

On October 15th, in the battle on the **Shaho**, the general reserve of the army consisted of 32 battalions belonging to five different divisions and five different army corps. In his order for the battle, Kuropatkin laid particular stress on the necessity of forming reserves (Army Orders dated August 15th, 1904): "Keeping back more than half of the force in reserve is the best guarantee for success." On December 27th, 1904, he made a similar statement.

The reserves are created to be used; every available man must participate in the decisive stage of the combat. If the enemy yields before the reserve is launched, so much the better; if he does not give way, all the troops that are at hand must be put in. The main thing is to gain the victory; scruples may be indulged in afterwards. A defeated commander who leaves the battlefield with troops that are still partially intact, has not made the most of the means at his disposal for combat, provided the situation was such that the launching of the reserves could have secured the victory. As shown by Hastenbeck (1757), by Idstedt (1850), and by Bapaume, at the moment of the crisis there is no sharp dividing line between victory and defeat, and the reserves may decide the fate of the day. The decision of Archduke Albrecht, during the battle of Custozza (1866), to push his last reserves into the fight was worthy of a great commander.

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*On July 31st, 1904, when, in pursuance of orders from General Headquarters, a regiment and a battery was to be despatched to Mistshenko's Cavalry Division, 15 km. away, a provisional regiment of two battalions was formed, without apparent reason, for the purpose from the 139th and 140th Infantry Regiments. In regard to the inclination of the Russians to form detachments, see LÖFFLER, I, pp. 11, 27, 53 and 54.

†See v. TETTAU, *Achtzehn Monate mit Russlands Heeren in der Mandschurei*, II, p. 483.

In contrast with this, **Russia** (1904): "In employing the general reserve, the commander-in-chief must be even more economical than the troop leader; he should, when necessary, detail single units to support this or that section, *but he should in no case use up his whole reserve before the decision has occurred.*" The failures of the British in the South African war may likewise be traced in part to a faulty use of the reserves. Thus, we read in the regulations of 1896: "The reserve should occupy a favorable defensive position in order to check the enemy in case of defeat; if the attack succeeds, the reserve should move up into the position and take charge of the pursuit.

"Troops that give up a fight are like the swimmer who, after having made the most inconceivable exertions to swim across a broad, deep river, shrinks from the last spurt and drowns, although he need only stretch out his arm to reach the opposite shore." (DRAGOMIROV).

In employing the reserve, it should be remembered that the whole available force must be launched at the decisive moment at the decisive point, and that the commander ought not to detach portions of the force intended for the decisive blow for tasks of secondary importance.

The launching of L'Estocq's Corps at **Preussisch-Eylau,** is still a model worthy of imitation.*

In the battle of **Vionville,** three battalions and four batteries were detached from the 20th Infantry Division, which had arrived during the afternoon, and sent to the right flank to take part in the action of the 5th Infantry Division, as infantry support seemed necessary on the right flank. When the head of the division reached Tronville, the question was discussed, as to whether it was desirable first to concentrate the division for action, or to throw the leading battalions into the Tronville forest, where portions of Lehman's Brigade were still holding their ground. As an advance of the French out of the woods would have endangered the left flank of the Prussian artillery line, three battalions were at once thrown into the forest, while the six remaining battalions were kept in reserve for the time being. Subsequently, three more battalions were sent forward to reinforce the infantry engaged in the forest.

*LETTOW-VORBECK, *Feldzug von 1806 und 1807*, IV, p. 107.

"What a decisive blow the 20th Division could have struck, if it had been employed in one body!" (v. LIEBERT).*

The decision is usually brought about by pressure on a flank, but it might become necessary to accomplish this result by launching large masses against some point of the hostile front.†

The difficulties of accomplishing this are best illustrated by the situation of the IIIrd Army Corps on the afternoon of August 18th, 1870, when Prince Frederick Charles yielded to the entreaties of General von Alvensleben and permitted him to advance south of the Bois de la Cusse.‡ Similar situations resulted in the case of the Austrian Ist and VIth Army Corps at Königgrätz, the French IIIrd and IVth Army Corps, on a front of 2.75 km., with the Guards in rear, between Noisseville and Failly, and, finally, the advance of the Ist East Siberian Rifle Division at Wafangu. The French regulations likewise contemplate a decisive attack made by large masses on a narrow front. If these troops which are to clinch the success gained by the fighting line, are deployed on the front laid down in regulations, they will be unable to use their weapons. It isn't mechanical shock action, but fire effect that decides the battle. In such a mass of troops, only fractional parts will be able to fire, the major portion is crowded together and becomes a dense, defenseless target, exposed to all the psycho-

*Gen. St. W., I. p. 595. *Kriegsgeschichtliche Einzelschriften*, 18, p. 580.—v. SCHERFF, *Kriegslehren*, II, p. 146.—Essay by v. LIEBERT published in Supplement of the *Militär-Wochenblatt*, 1895. From the description contained in the 4th Supplement of the *Militär-Wochenblatt*, 1895, p. 177, it appears, at any rate, that the support given by the 39th Half-Brigade was not absolutely necessary. On the right flank as well, a united employment of the force for the attack of Hill 970 ought to have been possible; as it was, regiments were cut up in making isolated assaults, which had no effect whatever on the outcome of the general action. KUNZ, *Kriegsgeschichtliche Beispiele*, 8/9, p. 128, et seq.

†General MINARELLI-FITZGERALD, *Infanteriemassen im Angriff*. Colonel CSICSERICS VON BACSANY of the Austrian Army, in a brilliant study entitled *Die Schlacht* (Vienna, 1908), argues that with the increased combat frontage of armies, local successes have no longer the same influence on the outcome of the battle as of old. Compare, for example, the envelopment of the Russian left flank at Liao Yang, and the penetration of the line at Yuhuntun (Mukden), with the effect produced by the capture of Chlum and St. Privat on the outcome of the battles of Königgrätz and Gravelotte, respectively.

‡*Der 18. August*, pp. 484 and 558, sketches 34 and 35.

logical impressions produced by crowding human beings into a narrow space.*

A brigade, therefore, should not deploy on a front of 1500 m., *i. e.*, put only about ¼ of its men in the first line; but no objection can be made if the brigade, in moving to the final decisive assault, at once advances on a front of 2500—3000 m.

13. THE CONDUCT OF THE LEADERS IN ACTION.

The difficulties of troop leading increase as the power of the commander to control and direct all ranks in action by words of command diminishes. In action, therefore, those means must be adopted that will facilitate the transmission of orders. This requires first of all the choice of an appropriate position for the leader.

The beginning of an action should find the leader as far forward as possible; during the advance to the battlefield, with the advance guard (par. 277 German I. D. R.), for neither messages nor reports, nor a map can adequately take the place of personal inspection of the situation of the enemy, of neighboring units, and of the ground. So placed, he can best direct the first deployment, upon which the future course of the action so largely depends, secure advantages by making prompt decisions in face of the enemy, save his own troops from making detours, handle them in accordance with a definite plan, and preclude arbitrary action on the part of the commander of the leading unit.

During the action, the superior commander can influence the course of the fight, his personal example excepted, only by employing his reserves. His place is, therefore, near the

*The successful attacks made by masses of fanatical warriors in colonial wars are carried out under such peculiar conditions that, for our purposes, deductions therefrom are not admissible. The defeat of the two French brigades at Bang-Bo (24th March, 1885), and at Ki-lua (28th March, 1885). LEHAUCOURT, *Les Expéditions de Tonkins*. The defeat of the Italians at Adua (1st March, 1896).

reserves, at a point that can be readily found, and never in the firing line.

A company commander should remain where he believes he can best control his company, as a rule, perhaps in the firing line. He provides for the supply and distribution of ammunition that is brought up from the rear, and regulates the coöperation of the platoons. (Pars. 216, 457 and 458 German I. D. R.).

A battalion commander should only in very exceptional cases take post in the firing line; he should nearly always remain with parts of the force that are held back for the time being, but, in any case, where he can effectively supervise his battalion. The choice of a regimental commander's position is influenced by the same considerations; when his regiment is acting as part of a brigade, he must select his position so as to facilitate the transmission of orders from brigade headquarters. The brigade commander will, as a rule, remain near his reserves, at a point from which he can best overlook the deployment of his brigade.

On account of the fact that extended order fighting predominates, leaders of all grades must be particularly careful to maintain connection between the several parts of their command, with each other, and with adjoining units, and to preserve their influence over their firing lines. Superior commanders should, in addition, see that their troops do not get out of hand, and all subordinate leaders, after carrying out a task assigned them, should endeavor promptly to rejoin their proper commands, or place themselves at the disposal of the commander of troops still engaged with the enemy.

These requirements will be fulfilled, if superior commanders order nothing that they should not and cannot order, and if the officers charged with the execution of the orders coöperate to attain the desired end, and do not abuse the freedom of action allowed them.

While subordinate leaders, up to and including company

commanders, are mainly occupied with fire control and fire direction, and should influence the men by their personal example, superior commanders have other tasks, which they must not neglect for the purpose of interfering in the sphere of action of their subordinates. They can influence the fire action only by sending the necessary forces to those portions of the firing line whose fire they wish to augment. An interference on their part with the action of subordinates is permissible only in case of obvious misunderstandings or mistakes, which would cause the combat to take a course other than that intended. The larger the unit commanded by an officer, the greater the latitude that must be allowed him. The leaders should concentrate their attention upon the general execution of their special tasks as part of the whole scheme, rather than upon supervision of details. It is by no means essential for all parts of the force to employ identical means to attain one and the same object. Every leader should bear in mind that *omission or neglect are greater crimes than a mistake made in the choice of means.*

The initiative of leaders of all grades is the foundation of great victories in war, but this initiative must neither jeopardize unity of action nor direct the course of events into channels not intended by the commander.*

The best safeguard against the results of an act of unjustifiable initiative is to ask oneself: "What orders would my superior have to give me, if he were in my place and knew what I know?"

14. UNITED ACTION VERSUS TACTICAL MISSIONS.

Although no one disputes that victory depends upon a superiority of fire at the decisive point, yet there is a great diversity of opinion as to how this superiority is to be attained.

General Bronsart von Schellendorff states:† "Every battle seeks to bring about a decisive victory, but this is, after all, invariably the sum

*See *Taktik*, III, p. 174, and V, p. 57, et seq.

†*Betrachtungen über die zeitgemässe Fechtweise der Infanterie*, 1891, p. 36.

of local victories. Successful battle-tactics consist of correctly estimating the tactical value of these local successes and of contriving to gain a victory at the decisive point; in other words, to manage so that the sum-total of positive factors will be greater than that of the negative factors."

In the opinion of the advocates of this course,* unity of action is attainable by practice and study, but not by set formations. If unity of action could be ensured in all bodies of troops by means of study and practice, there would seem to be no reason why the regulations should lay down still more definite rules to govern the manner in which an attack should be conducted. The matter is not so simple, however. Bearing in mind the great latitude that the regulations allow each individual in choosing the formation which he deems proper in a given case, it is obvious that many very different procedures may result. This in itself is no drawback, and to a certain extent this condition must exist, as the task in hand, the nature of the country, and the existing situation vary. But, if a given problem can be correctly solved in several ways, it will also admit of a decidedly incorrect solution; and it is the more likely to be solved incorrectly, the less study and practice is indulged in by a large part of the corps of officers, and the less this class of officers finds in existing regulations as a guide to conduct. When, in spite of undeniable progress, we see dispersed attacks and an unquestionably incorrect conduct in every maneuver, and this with a corps of officers nearly all of whom are professional soldiers, who have had the advantage of study and practice, what may we expect in war, where the corps of officers will be very largely composed of officers of the Reserve and Landwehr, who have but very limited opportunities for study and practice, but who, after the very first battle, may have to command companies.

General von Scherff,† the chief advocate of "united action," is opposed to the "combat with units of command" (*Kommandoeinheiten*) briefly sketched above. He makes a distinction between battle-tactics and the tactics of detachment warfare. In his opinion, the sum of the local successes can by no means gain the victory; that can only be done by the united launching of adequate forces at the decisive point. "No weapon in the world will ever alter the fact that five battalions united in one body have a greater inherent fighting power than five separate battalions—not to mention twenty separate companies—always provided that a united body of troops is also launched as one body."

Examples Illustrating the Necessity of a United Attack.

1. The 26th Infantry Brigade was alarmed and put in march toward the battlefield to support the advance guard brigade of the VIIth Army

*General VON SCHLICHTING, *Taktische und strategische Grundsätze der Gegenwart.* See also the essay in the July number of *Jahrbücher für Armee und Marine*, 1898.

†*Kriegslehren in Kriegsgeschichtlichen Beispielen der Neuzeit*, I-IV, *Ein Schlachtenangriff*, 1898.

Corps, engaged at **Colombey.** The commander of the 26th Infantry Brigade received orders from the commanding general to engage. It was not necessary for the brigade to provide its own reserve as the 25th Brigade had been directed to concentrate between Marsilly and Colligny, and to be at the disposal of the corps commander. The troops already engaged were in a critical situation; their moral and physical energy was exhausted. It is only too patent that the first battalion (Ist Battalion, 13th Infantry) appearing on the scene was thrown into the fight to afford at least temporary relief, but this insufficient reinforcement was involved in the general failure. After about a quarter of an hour, the 25th Brigade (the IIIrd Battallion, 73rd Infantry had remained in bivouac at Pange) was concentrating for action at Coincy, but, instead of its making a united attack, only the Ist Battalion of the 73rd Infantry was launched. This battalion did, indeed, pentrate into the "Tannenwäldchen" at the "Todten-Allee", but was then surrounded on three sides, had to fall back with considerable losses, prevented the further advance of the IInd Battallion of the 73rd Infantry, and rallied on the Füsilier Battalion of the 13th Infantry, on the bank of the Vallières brook. "Although the General Staff account of the war is silent on this subject, we are justified in assuming that only the presence of the brigade commander, who had learned a lesson from the second local assault, prevented the Füsilier Battalion of the 13th Infantry from making a fourth isolated effort. After re-forming the organizations, the new attack, which was made with indomitable spirit, proceeded more in connection with that of three other battalions advancing on the same line, and this united advance was closely followed by a second echelon consisting of the last battalion of the brigade (the IInd Battalion of the 13th Infantry), which had arrived just in time. The result was that the enemy was completely routed."*

2. At the Gorze-Rezonville road, on August 16th, 1870, the isolated attacks made against Hill 970 by eight battalions, belonging to three different brigades, likewise accomplished nothing, whereas, had a higher commander been present, a united attack launched by him would undoubtedly have been successful.†

3. The well executed attack made against the hill west of the suburb of **St. Martin,** on January 19th, 1871, by six battalions of the 29th Infantry Brigade shows the importance of the united launching of a large body of massed infantry. The engagement of the 16th Infantry Division, in particular the attack made on **Grugies** (battle of **St. Quentin**) is the antithesis of the above-mentioned attack. Although the situation did not necessitate the simultaneous launching of the available forces, the brigade attacked in driblets. The attack made by these fractions, launched one after another, was not able to bring about a decision. In the first place, at about 11 A. M., three companies (5th, 6th, and 7th of the 69th

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Gen. St. W., I, p. 479. VON SCHERFF, *Kriegslehren*, I, p. 41, et seq.

†*Gen. St. W.*, I, p. 631. VON SCHERFF, *Kriegslehren*, II, p. 271. KUNZ, *Kriegsgeschichtliche Beispiele*, 8/9, p. 128, et seq.

Infantry), soon afterwards supported by the 8th Company of the 29th Infantry, and the 8th Company of the 69th Infantry, attacked the French position at the railway embankment and cut. The Prussian troops fought with great gallantry, the 5th, 6th and 7th Companies of the 69th Infantry making four attacks, and the other two companies, three. Although these five companies succeeded in gaining temporary successes, they lacked a common commander, and were supported from the rear only when they were thrown back after fighting for three-quarters of an hour.

About noon, the four companies of the Ist Battalion, 29th Infantry, were brought up, but did not engage until the first line had been forced back and the 5th, 6th, and 7th Companies of the 69th Infantry, at any rate, were out of action for the time being. Incidentally, it may be mentioned that the Ist Battalion of the 29th Infantry attacked in three groups, the strongest of which consisted of 2½ companies, the weakest of only half a company. Only the strongest of these groups scored a success, and the Ist Battalion of the 29th Infantry was completely routed after a bloody fight. The 9th and 10th Companies, 29th Infantry, did not arrive on the battlefield until after the companies of the Ist Battalion of this regiment, whose heroic fight cannot be sufficiently praised, had ceased to exist as tactical units.

At 12:30 P. M., the 3rd and 4th Companies of the 70th Infantry were brought up and threw back the French, but were in their turn defeated. At this moment the 10th and 11th Companies of the 40th Infantry arrived; these companies were also able to advance, but their success was a temporary one only.

At 1:30 P. M., the IInd Battalion of the 40th Infantry appeared, threw the French back, but was soon attacked by superior forces and suffered the same fate as its predecessors.

At 2:30 P. M., the Füsilier Battalion of the 70th Infantry and the 9th and 12th Companies of the 40th Infantry were brought forward, but only the former engaged seriously at once—again without success. A little while later, the 9th and 12th Companies, 40th Infantry, advanced energetically. At about 3:30 P. M., the French made a very strong counter-attack; all that had been gained seemed about to be lost again, when the decision was finally brought about by the vigorous action of the 41st Infantry and a charge made by Reserve Dragoons.

The capture of Grugies, of the sugar mill, and, a little later, of Gauchy, now followed.

The resistance of the French was broken. General von Barnekow had thus, apparently, gained his object; but at what a price? In this engagement, the launching of troops in driblets may be very accurately followed:

1. At 11 A. M., five companies were launched in two separate groups (5th, 6th, and 7th Companies, 69th Infantry—8th Company, 29th Infantry and 8th Company, 69th Infantry);

2. Toward noon, four fresh companies (1st Battalion, 29th Infantry) were also launched in separate groups;

3. A little later, two fresh companies were put in (9th and 10th Companies, 29th Infantry);

4. At 12:30 P. M., two fresh companies were launched (3rd and 4th Companies, 70th Infantry);

5. A little later, the 10th and 11th Companies, 40th Infantry, were pushed in;

6. About 1:30 P. M., the IInd Battalion, 40th Infantry, was brought up;

7. About 2:30 P. M., the Füsilier Battalion, 70th Infantry, and the 9th and 12th Companies, 40th Infantry, advanced.

Thus, between 11 A. M. and 2:30 P. M., General von Barnekow gradually drew into the fight twenty-five companies, in seven different detachments, from the reserve formed by the 16th Infantry Division at Essigny le Grand. Besides, the troops generally did not appear on the battlefield until the energy of the troops already engaged was exhausted.*

Moreover, the retreat of the several detachments was not a voluntary one, for the French, thanks to their great superiority, generally forced them to retire. This engagement thus presents a series of partial successes, which became reverses, however, in a very short time.

Launching reinforcements in driblets increased the numbers required beyond all reasonable bounds, produced heavy losses, and involved the weak reinforcements, which arrived successively, in disaster, without turning the tide of the battle. Decisive victories can only be brought about by simultaneously launching masses.

"The system of close order battalion tactics was no longer practicable under Chassepot fire, and everyone promptly went to the opposite extreme of extended order, company column tactics, with which all were sufficiently familiar, since it had been carefully practiced in minor field exercises in time of peace." (The attack made by the 26th Infantry Brigade against **Schlosz Aubigny,** August 14th, 1870.†)

There is always danger that unity of action will be sacrificed by the continued assignment of individual tasks; that the leader will not be able to count with confidence on the initiative of subordinate leaders restoring this unity, and "that, in the end, no higher commander will any longer have the assurance that his wishes will be carried out." The battles around Metz during August, 1870, show a tendency on the part of the infantry to

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*KUNZ, *Nordarmee,* II, pp. 135 and 212.

†*Gen. St. W.,* I, p. 466; VON SCHERFF, *Kriegslehren,* I, p. 16; VON MALACHOWSKI, *Scharfe Taktik und Revue-Taktik,* p. 18. This example is the more instructive, as both advocates of these opposing views show how, in their opinion, the attack should have been made. The same attack is, moreover, treated in *Militär-Wochenblatt,* 1901, Numbers 41 and 42, under the title *Selbständigkeit und Auftragsverfahren.*

leave behind, in reserve and in rallying positions, parts of the troops launched to perform a certain combat task, "to detach parts to maintain communication (very often not at all endangered) with neighboring detachments", and to despatch others to a distance to cover a flank, or to make a wide turning movement for the purpose of enveloping the enemy's flank.

To prevent a battle from degenerating into a number of disconnected, local combats, and to ensure that the enemy will be actually subjected to the fire of as many rifles as the supreme commander intended, General von Scherff proposes that the battle formation, consisting of several echelons separated by fixed distances, be taken up outside of the zone of hostile fire, and that these echelons then advance simultaneously and as uninterruptedly as possible upon the enemy. In this movement the terrain is to be taken advantage of only so far as the orders permit. In view of the flat trajectory of the modern rifle, he concedes that fire while in motion, formerly considered permissible by him at long and medium ranges, may be replaced by an advance by rushes of the firing line, alternating with firing in a prone position, the ammunition to be expended at each halt being fixed by the officer charged with fire direction. He moreover considers it necessary to have a main firing position, located approximately at the outer limit of short ranges, for the purpose of gaining the superiority of fire. Base units must be designated in order to prevent weak detachments from encountering the enemy single-handed. Moreover, he intends to keep the advance going by increasing the fire, and by detailed and definite orders providing for the constant reinforcement of the firing line by men of the steadily following supports and reserves. Further, since according to his proposal, a halt by the rear echelons of an attack that has once been launched, is excluded on principle, it follows of necessity, that, for the fire effect of the firing line at the really decisive ranges, there can remain only a very brief period of time, measurable in minutes, which is amply sufficient, in his opinion, for the object to be accomplished.

It is charged that General von Scherff's proposal* (see p. 205 supra) favors a set scheme for conducting every fight. This is not true; there is quite a difference between "more definitely regulating the conduct of an attack", aimed at by the author of *Kriegslehren,* and the formulation of a normal procedure.

"Where a number of individuals are to coöperate for the purpose of performing a certain task, the nature of the case requires that each one be able to picture to himself beforehand the nature of the task, so that his share in it will appear clear and definite. Each one must know what he is to do, when and where he should engage, what his role is to be, etc. etc., or the result will be hopeless confusion."—"The drill regulations

*The 10th Supplement of the *Internationale Revue* 1900, gives General von Scherff's ideas on the infantry attack. See also his *Reglementarische Studien,* p. 58, and *Ein Schlachtenangriff,* p. 102. *Vergleichender Rückblick auf die neueste Tagesliteratur über den Infanterieangriff,* 1906

must supply this picture and the drill-ground is the place where its general forms should be impressed upon every individual participating in the performance of a task." Experience has taught us that this image of the drill-ground becomes distorted in war through influences which have almost never permitted it to appear on the battlefield in its true form. The initiative of subordinate leaders should overcome the obstacles which stand in the way of a realization of this ideal image.

The system of tactical missions reckons with the sum-total of local successes, assigns tasks to the different units of command, and leaves to the latter the choice of the means, without restricting their independence. The course of the combat can be influenced only by the action of retained forces, and it is sought to produce united action by acquainting all leaders with the object of the combat, they in turn endeavoring to attain this object even though they do so in different ways.

The system of united action seeks to ensure victory by simultaneously placing in readiness all the forces intended for the general combat, by an orderly concentration for action, and by launching the troops at one and the same time, without, however, requiring all parts of the force to employ the same formations. This system dictates to the leader the number of troops he should launch. Since in action everything is ordered as necessity therefor arises, the result is that the leader loses sight of the general action in view of the great number of separate orders that must be issued.

In the system of tactical missions, there is danger of arbitrary action on the part of subordinates, and of dispersion; moreover, it is not always easy to deploy strong firing lines, and there is an increased tendency to overestimate the value of cover and, in consequence, to overstep the assigned frontage.

The system of united action is open to the objection that initiative of the individual disappears and that the rules laid down in drill regulations degenerate into a pattern devoid of all spirit.

In **Austria** (1906), Captain Wachtel* suggests that, when a decision is not sought, an attack in groups be made, and that, when a decision is sought, a united attack be made. In **Switzerland,** Major Sondereggert advocates a procedure based on that of General von Scherff.

The initiative of the individual should carry the troops over difficulties occasioned by the terrain or the enemy. Such checks occur most frequently from the time a force enters the zone of effective hostile fire until the assault has been decided upon. In the author's opinion, the individualized attack is a concession made, at the expense of united action, for the purpose of making the attack succeed at all.

**Gruppen und Einheitsangriff.*

†Der ungebremste Infanterieangriff, 1906.

XI. THE DEFENSE.*

The invariable guiding principle in defense is to make the most profitable use of fire. This principle governs in the selection of a position and in strengthening it artificially.

The defender's object may be—

1. **Temporary occupation** of a piece of ground;

2. **Purely passive defense,** outpost, rear guard, and delaying actions;

3. **Offensive-defensive action,** *i.e.,* to bring about a decision by combining the offensive with the defensive.

In fortress warfare, situations may arise which may make it necessary to hold a piece of ground obstinately, without it being possible to assume the offensive. In the French, Russian, and Italian regulations, only the offensive-defensive is considered. The Italians see in the defensive nothing but a preparation for the offensive; the Russians seek to shake the enemy with fire in defense, so that they can subsequently assume the offensive.

The defensive is dependent upon the terrain, and is subject to the condition that the locality where the tactical situation requires a stand to be made offers a position favorable for employing fire to good advantage, and that the opponent actually attacks where the defender expects him. The employment of the defensive is restricted by its dependence on the ground and on the measures of the enemy. Its employment may frequently be explained by the fact that one of the contending parties allows itself to be checked to such an extent by the initiative of the other that it can only offer a passive resistance. Such passive resistance may here and there score

*Taktik, V, p. 308. HOPPENSTEDT, *Taktisches Handbuch für den Infanterieoffizier,* p. 30.

a success by chance (Plevna, St. Privat), but, as a rule, only the assailant reaps a benefit from such situations.

1. THE PASSIVE DEFENSE

seeks to avoid a decision, and must therefore endeavor, by opening fire at an early moment, to prevent the enemy from reaching short ranges. (See p. 147 supra). It is not absolutely necessary to have a clear field of fire or strong reserves, but the latter, kept a considerable distance in rear, must be strong enough to enable the force to disengage itself from the enemy.

Since only a temporary resistance is to be made, it is permissible for the force to cover a greater front. The defender should endeavor to compensate for his numerical inferiority by expending a large amount of ammunition and by employing machine guns. It is an advantage to have obstacles in front of the position and cover in rear of it, because the former retard the enemy's advance and the latter shelters the troops from his fire in case of a retreat.

2. THE DEFENSE SEEKING A DECISION.*

Decisive results can only be obtained at short and medium ranges. Long range fire may, indeed, inflict losses on the enemy and delay his advance, but it cannot repulse him. (See p. 148 supra).

It is not sufficient merely to ward off the attack with fire; the offensive must be assumed. When this is not done, the assailant can repair his losses and try another attack. When the defender has repulsed the enemy, he should follow up this success with an attack. However, as he will rarely be able to do this with the force at his disposal, fresh troops

*During the attack on the large work at Gorni Dubniac, the Finnland Regiment was unable to advance from its last position, only 70—100 paces distant from the enemy, over the foreground swept by grazing fire. Several attempted assaults were repulsed.

will be required. (Beaune la Rolande, Lisaine). The change from the tactical defensive to the offensive offers the same difficulties as the corresponding strategical move; but, in the former case, there is present, in addition, the element of danger and the difficulty of perceiving the right moment.*

A position is of value only when it compels the enemy to attack, directs his movements into definite channels, and induces him to make wide turning movements, which cause him to lose time and produce favorable conditions for the assumption of the offensive on the part of the defender. Every position that enables the defender to use all his weapons, and does not deter the enemy from making an attack, is suitable for this purpose.

"By placing our troops in an unassailable position, we actually refuse battle and force the enemy to seek the decision in another manner. * * * A defensive position approaches its ideal to the extent that its strength is hidden and opportunity is offered of surprising the enemy by our tactical combinations. One should endeavor to conceal the advantages which one intends to derive from the formation of the ground, just as one hides from the enemy the bulk of one's troops and their actual position. This is, indeed, only practicable to a certain extent, and requires perhaps a peculiar and little used method of treatment."†

Modern firearms make the defense so strong in front that it suffices to hold this part of the position with a weak force supplied with plenty of ammunition, and provided with weak supports, at a few points, to replace losses. As these supports have a definite task to perform, they are posted as near the first line as the available cover permits, in order to cut down the distance to be traversed by them under fire.

*Taktik, V, p. 320. Compare this with Benedeck's hesitation at Königgrätz.

†CLAUSEWITZ, *On War*, VI, 12 (*Militär-Klassiker*, p. 364). The Boers were masters of the art of concealing defensive positions. At Colenso, on the Modder River, and at Magersfontain, their positions were located in places where neither the British artillerists nor the reconnoitering detachments suspected them to be.

When practicable, they are intrenched within the firing line itself. As it is advisable to supply these troops with a great deal of ammunition, some of the ammunition wagons belonging to the battalions held in reserve may be turned over to them. The general reserve intended for offensive action should be kept far in rear of the line. When kept too close to the first line, the defender will be unable to move it to any point desired, after the direction of the attack becomes apparent. The defender should examine his position from the point of view of the attacker, and ask himself, *"With how weak a force may I occupy the position and still obtain the frontal strength described in the regulations, and how strong can I make the general reserve so as to bring about a decision?"*

At some parts of the position, an attack will have good prospects of succeeding, at others it would encounter difficulties, and, finally, at others it could not possibly succeed. While many troops are needed in the first-mentioned portions (sections), comparatively few troops will suffice to hold those sections which are less favorable for the attacker (on account of their free field of fire, obstacles, and the absence of artillery positions in which the attacker can place his guns). This leads to a division of the defensive position into sections, each forming a separate unit of command (battalion or company) and, when necessary, detailing its own reserve (section reserve). When the frontage of the sections, as determined by the above-mentioned examination of the position, is considerable, or when obstacles lie within the position, a further subdivision may become necessary. This does not imply that the position must be held in equal strength all along the line; portions of the line that are very difficult to attack need only be kept under observation. Gaps in the defensive line are, as a rule, of very little value to the assailant, as the defender will frequently be able to sweep the space in front of them from a flank. "In order to keep all parts of the foreground under observation, and to prevent portions of the hostile force from escaping the defender's fire, a division of the foreground cor-

responding to the division into sections must be made when necessary." (Par. 403 German I. D. R.).

Weak points, *i. e.*, points against which the assailant can suddenly mass superior forces at short range, or in the defense of which a coöperation of infantry and artillery is impossible, must be specially strengthened: by obstacles; provision for flanking the hostile advance; and preparation of supporting points in rear of the position. In addition, such weak points must be occupied with a strong garrison, by employing two firing lines, one above the other; reserves; and machine guns.

Enclosed farm yards (Point du Jour, on August 18th, 1870), and small patches of timber, are best not occupied at all; they are far more valuable as sham defenses in that they draw the fire of the assailant. At any rate, it is a question whether, at the last moment, when the hostile assault must be warded off, it will be possible to occupy such points.

As a general rule, only a single defensive position, consisting of an infantry and an artillery line, is selected.

The Russians invariably posted strong advanced detachments in front of their main defensive positions. As a result, the most serious fights usually occurred in the positions taken up by these advanced troops.* At **Haicheng**, for example, a strong main position had been prepared, in which a stand was to be made. In spite of this, the IInd Siberian Corps was left in a strongly fortified advanced position west of **Simutcheng**. This corps, in its turn, fortified two lines of advanced positions far in its front.

"Thus, on July 31, 1904, only seven battalions of this corps finally fought at **Daputsi** and **Liadapu**. When they were thrown back by superior forces, the mistake was made of bringing up fresh troops to regain the position captured by the enemy. These troops arrived too late and had to make a difficult attack on the Japanese, who had already occupied the captured position. Naturally their frontal attack accomplished nothing.

"The force thus suffered a defeat needlessly, and, although the defensive had been decided upon, a lot of men were sacrificed in an attempt to retake an advanced position that had been captured by the enemy.

*LÖFFLER, *Russisch-japanischer Krieg*, I, p. 109. See *Taktik*, V, p. 305, in regard to the numerous positions in the valley of the Shaho.

The corps evacuated its strong position without a fight when its line of retreat was endangered by Mistshenko's being forced back. The Russians likewise evacuated their main position at Haicheng when news was received that strong hostile forces were advancing against the left flank of the position."*

As a rule, it is not advisable to occupy **advanced positions,**† *i. e.,* positions lying within effective range of the main position. Supporting points immediately in front of the main position, projecting from it like caponiers, and flanking the ground over which the assailant will have to make his attack, must not be confounded with these advanced positions. St. Hubert and St. Marie aux Chênes, on the battlefield of Gravelotte are good examples of both classes of positions. In order to gain time, a commander may sometimes find it advantageous to occupy and temporarily defend advanced positions lying still farther to the front. (Lisaine, and Shaho). In doing this, favorable terrain (Chavannes on the Lisaine) and skillful leadership are essential.

In **France** and **Russia** much is expected of advanced positions. In **England** particular importance is attached to them when they draw the enemy in a direction facilitating the conduct of a counter-attack. The British consider that supporting points lying in front of the position had best be left unoccupied, unless they can be supported by artillery fire from the main position.

"Smokeless powder and the great range of modern firearms will frequently make reconnaissance so difficult that it will be possible to gain an approximate idea of the enemy's strength only by a fight. For this reason, in situations similar to that existing west of Belfort, in January 1871, advanced detachments, whose mission it is to deceive the enemy as to the defender's strength, and to compel him to deploy, will have a greater justification now than at that time. Nowadays, such detachments may cover a considerable front without danger, especially when they are plentifully supplied with ammunition. This will make it

*See *Kriegsgeschichtliche Einzelschriften,* 41/42, p. 49.

†*Taktik,* V, p. 270, et seq. No objection can be made to the contemplated construction of advanced positions in front of the Shaho position, as the Russians desired to gain time for the offensive movement to be made by their left wing. The uncertainty and hesitation produced by the constant changes in orders, and the excessive reinforcement of the advanced detachments, which allowed themselves to be led into making a stubborn defense, was fatal.

still more easy to deceive the enemy, and a skillful defender will know how to make the most of it."*

Advanced positions† are apt to mask the fire from the main position, and fights for their possession may easily lead to the defeat of the troops holding them. The danger of the fight taking place and being decided in the advanced position must be reckoned with. (Battles of Ligny and on the Hallue). On the other hand, it may be advantageous to employ scouting detachments, cyclists, and machine guns, and to construct dummy intrenchments in front of the main position. (Par. 407 German I. D. R.). The French, more than anyone else, are convinced of the advantages to be derived from an employment of advanced positions (for example in deceiving the enemy as to the location of the main position). In a deliberately planned concentration and advance into action, such positions are, however, so effectively enveloped that they do not come into play at all and fall an easy prey to the enemy. However, we do not wish to deny their occasional usefulness in cases where it is necessary to gain time for concentration and for strengthening the main position. In fights for their possession, an idea may frequently be gained of the intentions and dispositions of the assailant. Moreover, they offer opportunities for surprising the enemy with fire, and induce him to make premature attacks and to mass his troops in the ones he has captured.

Next to a free field of fire (clearing the foreground, and ascertaining ranges), the determining factors in selecting a position are elbow room in and in rear of the position, supporting points for the flanks, and cover. The natural cover available on the ground is made use of as best suits the purpose of the action.

The line in which the artillery intends to fight the decisive action constitutes the "framework" of the position. Although

*_Studien zur Kriegsgeschichte und Taktik_, II, p. 237.

†Par. 21 German _Manual of Field Engineering:_ "Their use is principally restricted to special cases in fortress warfare."

artillery will rarely be able to perform all its tasks in a single position, its first position is selected with due regard to the position of the hostile artillery. The most important position is that from which the hostile infantry attack is to be repulsed. This should be selected far enough in front of the artillery to enable the latter to fire over it, and to deprive the assailant's artillery of the opportunity of hitting the defender's infantry and artillery at one and the same time. (Par. 401 German I. D. R.). A distance of 600 m. between infantry and artillery is considered sufficient for this purpose. In view of the protection afforded by gun shields against infantry fire, it is scarcely necessary to post skirmish lines in advance of the artillery. But, where the infantry line is not continuous in front of the artillery, troops should be posted, so as to protect the artillery personnel from being annoyed by hostile patrols. It will seldom be possible for a commander to do justice to the requirements of both arms; in every compromise, one or the other arm is only too apt to be placed at a disadvantage. The needs of the infantry, whose choice of a position is more restricted, take precedence. While infantry can govern its action by that of the artillery during the preparatory stage of an attack, this is impossible in defense, as the infantry is obliged to carry the fight through to its logical conclusion in the position in which it is begun.*

3. FORTIFYING THE POSITION.†

The apprehensions formerly entertained in regard to prematurely fortifying a position, and which are still shared by the French regulations, are no longer to be found in the new

*As the artillery is less restricted in the choice of positions, and as the final outcome of the fight depends, after all, on the outcome of the infantry action, the demands of the infantry, contrary to par. 292 German I. D. R., must be considered in the first place.

†Germany: *Manual of Field Engineering*, 1905. France: *Instruction pratique sur les travaux de campagne* (December 24th, 1906). England: *Manual of Military Engineering*, 1905. Russia: *Mitteilungen vom Ingenieur Comité*, No. 41 (1906). The Austrian and Italian regulations are undergoing revision.

regulations. The construction of field fortifications requires time, if they are to be of value, and if they are to give leaders and troops the assurance that they can be defended by the minimum number of men.* Even intrenchments that have been constructed in vain will frequently prove useful in deceiving the enemy. In many cases, it will be necessary to be prepared to meet a hostile attack made from several directions. This contingency should be taken into account by at least preparing for the work beforehand.

"If the situation turns out to be different than was expected, the intrenchments already constructed should not influence the decisions of the commander. On the other hand, the consideration that the works might be built unnecessarily must not cause their construction to be omitted altogether." (Par. 311 German I. D. R.).

In the preface to the French regulations, it is emphasized that intrenching a position ought neither to impair the spirit of the offensive nor hamper the movement to the front. "Intrenchments are a means to an end, but not the end itself. They should only be used when no violence is done thereby to the tactical situation, and one should never hesitate, for a single moment, to abandon them, if the situation requires, or to construct others, at another place, if it becomes necessary." The men should therefore be trained in handling the portable intrenching tools, until they can use them skillfully in any position of the body.

"The use of intrenchments may also be abused. To remain inertly in a place is just as fatal as to advance without making use of cover. When temporary halts are made, the commander for the time being, often placed in that position by chance (*chef du moment, chef d'unité ou chef de groupe éventuel*), indicates whether or not intrenchments are to be constructed."

Battle intrenchments are to protect the soldier against hostile fire, without hampering him in using his rifle. "They are one of the factors which ensure economy in men, in that they save a body of troops from suffering unnecessary losses. But their importance always recedes before the general requirements of an action, and they should never in any way interfere with the advance of troops; on the contrary, intrenchments are

*At 10 A. M., on August 18th, 1870, General Canrobert received orders to place St. Privat in a state of defense. At 11 A. M., the first reports of the approach of the Prussian Guard were received, and at 4 P. M., Ste. Marie aux Chênes was in German hands. Hence, only five hours were available for these preparations for defense.

to make it possible to bring troops within effective range of the enemy, without impairing their physical condition or their morale."

Intrenchments enable a commander to save troops, which he can use offensively at the decisive point. They do not fulfill the object for which they were intended, when they make it easier for the enemy to pick out the position. "Works which cannot be perceived from the foreground even through powerful field glasses, afford the most effective protection against artillery fire." Trenches should therefore be deep, have a low parapet, and be properly masked.

The commander indicates when work is to begin. Every unit must intrench the portion of the defensive line which it is to defend; working parties, specially detailed from troops not intended for the immediate defense of the position, can be counted on only when extensive works are to be constructed.

Continuous lines of trenches are seldom built; it suffices to construct a line of works with intervals, *i. e.*, battalion groups, the intervals being simply held by a weak force.

These battalion groups (par. 24 German Manual of Field Engineering) are constructed without regard to any fixed form, as the tactical employment of the companies requires. They consist of firing trenches (flanks refused and echelons in rear of the wings), provided with splinter proofs, and adequate cover trenches, so that all the men, if possible, will be sheltered from artillery fire.

The aim is, first of all, to construct inconspicuous standing firing trenches. These should have low parapets and be provided with numerous traverses to restrict the effect of high explosive shell. In order that these traverses may not betray the location of the position, they should not rise above the parapet.*

*These traverses afford very little shelter against enfilading fire; it is advisable to keep sand bags in readiness as a protection in case such fire is received.

Deep, narrow trenches afford the best protection against artillery fire (the trench should be about 0.60 m. wide at the bottom). Narrow trenches are especially difficult to pick out from a balloon. In constructing trenches having no parapet at all, special precautions must be taken in order that their location may not be betrayed by the scattered earth or by their rear wall, which will be visible when they are located on the slope facing the enemy. When the trenches are to be held for some time, provision must be made for the construction of splinter proofs,* other overhead cover, and loopholes of observation.

Numerous light splinter proofs are generally to be preferred to a few larger and stronger ones, as they afford sufficient protection against shrapnel bullets and fragments. They may be protected against direct hits from field guns, or other guns having a flat trajectory, by sloping their roofs to the rear at an angle as nearly as possible coincident with the angle of fall of those projectiles.

Since field intrenchments are incapable of furnishing protection against direct hits from guns having a curved trajectory, this object must be attained by skillfully distributing splinter proofs along the front. These should be inconspicuous and should not take up too much room. The comfort of the troops in the trenches should also be provided for by constructing kitchens, latrines, drainage ditches, and dressing stations.

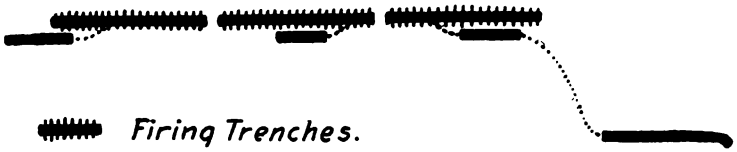
In addition, field magazines for storing ammunition should be built, and alarm arrangements made. Moreover, covered communication should be provided along the line and to the rear. The front and gaps in the line may be very effectively flanked by fire from skillfully constructed refused wings.

In constructing a battalion group of intrenchments, provision will have to be made, in addition, for the following:

*These lie about 0.50 m. below the natural surface of the ground and accommodate 5—6 men; they are separated from each other by an earth wall 1 m. thick.

Intrenchments for a Battalion.

< 150m

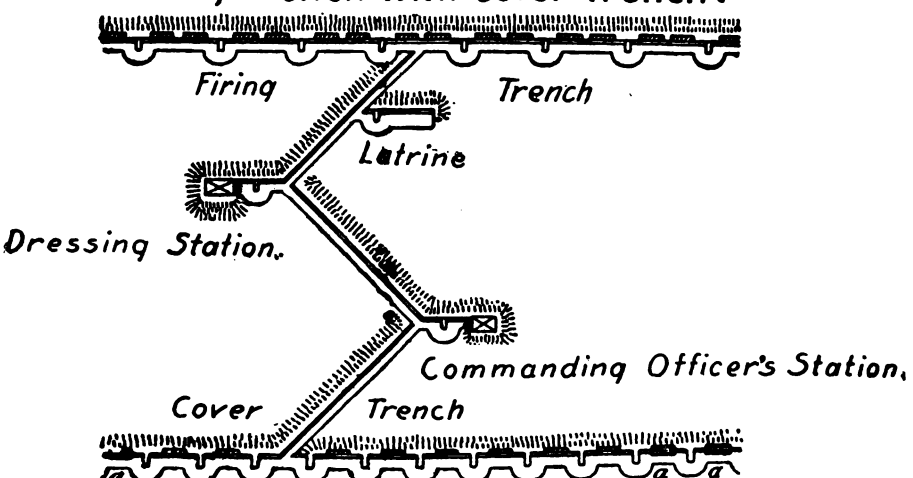


Firing Trenches.

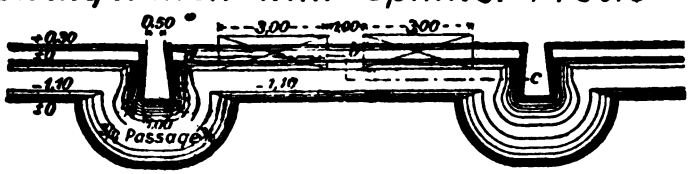
Cover Trenches.

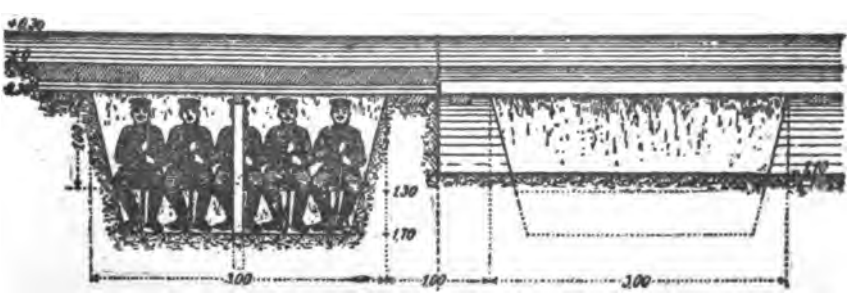
..... Communicating Trenches.

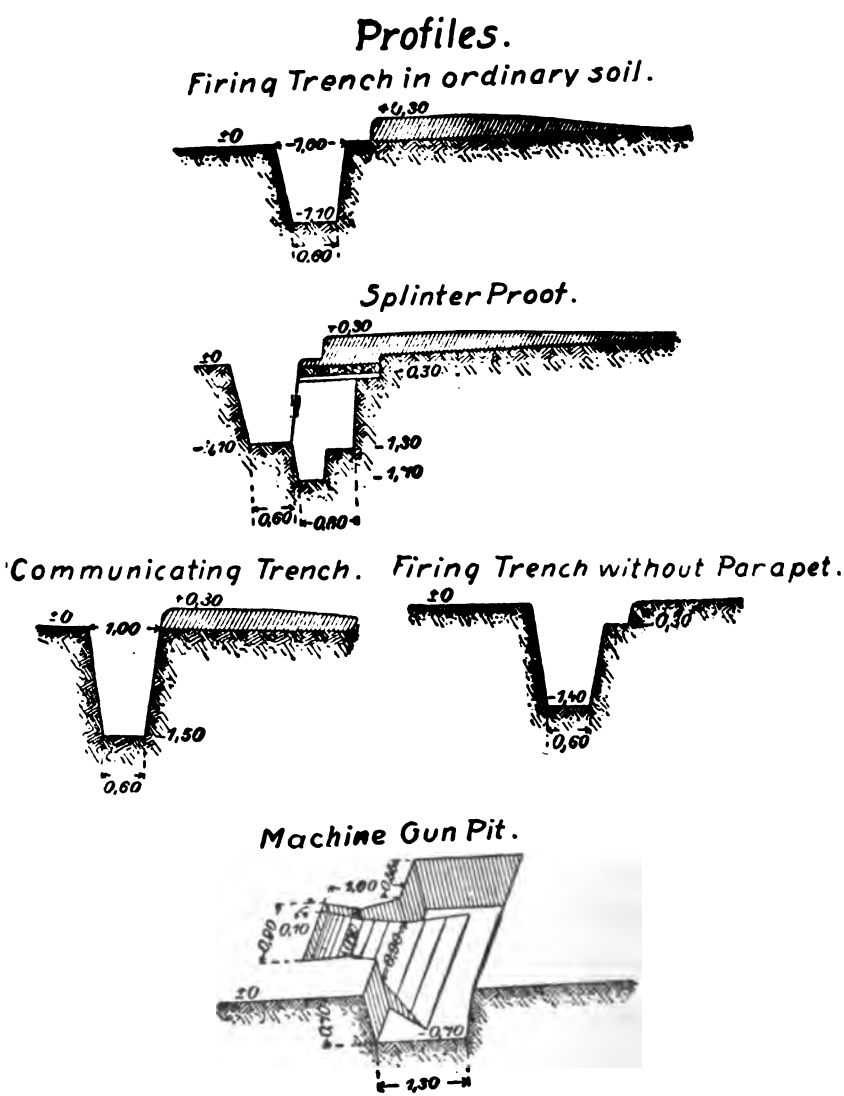
Firing Trench with Cover Trench.



Firing Trench with Splinter Proofs







1. **Observation of the foreground,** "for the purpose of reconnaissance and security, as well as for noting the effect of one's own fire." In order that observers may not betray the location of the position, it is recommended that they be posted at inconspicuous points affording a sufficiently extended view,

and screened from the observation of the enemy. When they have to be posted in the defensive line, the terreplein is either lowered in places, so that they can just look over the parapet, or special observation stations are constructed. Provision must be made for communication between the several parts of the line and with the next higher headquarters.

2. **Clearing the foreground.** As a rule, it will be practicable to employ for this work troops not needed in digging trenches. As time is lacking in field warfare for extensive work, such as cutting down embankments and removing dead angles, one will have to be content with trampling down or burning standing grain, removing objects which the enemy might use as aiming points, and cutting clearings through woods. It is not advisable to demolish stone walls and houses, as the debris is difficult to remove and affords cover to the enemy.

3. **Dummy intrenchments and masks.*** These are to deceive the assailant as to the position and extent of the defensive works. They should not be located in the same fire swept zone as the defensive works themselves, and at a distance should look like real fortifications. Masks are to screen defensive works or troops, without restricting the fire of the latter. Natural features are best suited for this purpose, but may be replaced or supplemented by artificial masks.

In many cases, it will suffice to place a few skirmishers behind a parapet that has been hastily thrown up with a plow.

4. **Cover trenches and communicating trenches.** These constitute a considerable portion of the defensive works. Communicating trenches may be either covered ways or zigzags, and connect the cover trenches with the firing trenches. Sortie steps should be provided in order to facilitate a prompt advance from the trenches. In many cases, it is impossible to avoid placing firing and cover trenches so close to each other that the enemy's shells can strike both simultaneously.

*_Taktik_, V, p. 291. At Magersfontain, the Boers constructed dummy trenches on the crest, while the trenches actually held by them were located at the foot of the slope. The result is well known.

5. **Obstacles.** These need only be constructed when two forces confront each other for a protracted period. The purpose of obstacles is to hold the enemy where he will be exposed to the most deadly fire; retard his advance; compel him to confine his movements to certain avenues of approach (this is especially valuable in night combats); and eliminate dead angles in front of the position. The presence of extensive obstacles forces the enemy to advance systematically. As a rule, they can only be removed by pioneers. They should not be located too near the position, as they are apt to be damaged by artillery fire directed at the position, and interfere with the defender's fire. When they are too far in front of the position, the defender will not be able to guard them and prevent their destruction. In general, they should not be more than 200 m. from the position. It is better to construct several lines of small obstacles than a single line of large ones. The requirement that obstacles must not interfere with the defender's fire, must not afford the enemy an opportunity to approach under cover, and must remain intact under hostile artillery fire, is best met by marshy ground and by wire entanglements. Obstacles should be provided with a slight glacis in order to prevent artillery fire from destroying them prematurely. When wire entanglements are too high, they are easily seen at a distance, and, although they are little damaged by artillery fire, the attacker can make preparations to remove them.

Russian Views.

A defensive position consists of an advanced position, a fighting line with firing trenches and batteries, supporting points in rear, and, finally, a fourth line, which serves as a rallying position. The key to a position, which lay formerly in the line of supporting points, lies at present in the firing trenches in which supporting points must be provided. (Colonel Golenkin advocates the use of semi-circular works as supporting points, and Lieutenant-Colonel Mordovin large closed works). "These semi-circular works are in a sense the anchors by means of which the firing line clings to the position which it has occupied." It does not matter if the enemy penetrates the first line and captures one or two of these

supporting points, for others remain on either side; the latter and the second line of supporting points then form a new though somewhat indented defensive line. As the attacking force which has penetrated into the position, is hemmed in on both sides, it will hardly be able to sustain the counter-attack made by the defender's reserves, and its temporary success will turn into defeat. But, in order that this may be accomplished, a second line of supporting points is absolutely essential. Large closed works of high command, but a smaller number than is employed in the first line, are recommended for this purpose. According to Russian opinions, several lines of fortifications are essential in order to check an enemy who has penetrated the first line, and to facilitate the defender's final retreat in case of necessity.

Particular importance is attached to advanced positions, to positions for the reserves, echeloned to the right and left rear of the flanks, and, finally, to rallying positions. Advanced positions are either to serve "reconnaissance purposes," by forcing the enemy to an early deployment, or to do duty as "caponiers" from which a flanking fire may be brought to bear on the foreground.

Advanced positions, doing duty as "caponiers," are invariably to consist of closed works, those serving "reconnaissance purposes" of open works. The latter are to be defended "to the last ditch," and are not to be evacuated until the enemy approaches to about 400 m. or less, but the garrison is not to allow itself to become involved in a bayonet fight.

In contrast with this distribution in depth—2 km., in the model given —Lieutenant-Colonel Jabel, whose views are based on the same experiences, advocates the use of only one line of fortifications. He states: "The length of the battles, which sometimes lasted two weeks, as well as the terrible intensity of fire in general and artillery fire in particular, produced such an absolute nervous exhaustion that the decisive action could be fought only in a single line. With its capture, further fighting had only small prospects of success * * *" "When firing trenches have been constructed at the points where the best effect can be obtained from long and short range fire, they should not be evacuated prematurely, but held, in order to make the most of this fire effect, until the enemy arrives close enough to use his bayonets. If the troops holding the trenches retire immediately before the bayonet fight, their retreat invariably becomes a rout, and, in any case, entails tremendous losses, for, after leaving their trenches, they will be helpless and exposed in the open to the hostile fire."

4. THE CONDUCT OF THE DEFENSE.

In his *Tactical Handbook,* Major Hoppenstedt suggests a method, well meriting attention, for decreasing the effect of artillery fire on a defensive position. He believes that dummy

intrenchments, not too conspicuously located, partially, but not skillfully masked and occupied, will deceive the attacker's artillery for some time, at any rate, until the advanced troops of the attacker induce the defenders to man their parapet and expose themselves to shrapnel fire. The "defense should be conducted in such a manner that the garrison of the main position will not need to expose itself to the enemy's artillery fire as soon as his advanced troops appear." Major Hoppenstedt believes that this can be attained, in hill positions, by conducting the fire fight, at long and medium ranges, from positions in rear, the defender moving up into the main position, specially prepared for this purpose, when the attacker disappears in the defiladed spaces in front of it. The objection to this method is that it necessitates too large a force to hold the position.

"In a protracted, obstinate fight, the defender's trenches, exposed to the combined hostile infantry and artillery fire, will finally become filled with dead and wounded, and it will rarely be practicable to remove them. The arrival of reinforcements will increase the confusion and the losses, and the fighting energy of the troops will decrease with tremendous rapidity. This is one of the greatest disadvantages of the defense as compared with the attack and its constantly moving lines.

"In such cases, which will be typical at points where the attacker intends to penetrate the line, it may be a real act of salvation for the defender's firing line to rush to the front.

"In fighting at short ranges, especially just before the assailant makes his assault, such a rush to the front on the part of the defender's line, may be a good move for another reason. As is well known, the attacker's artillery must change targets when its infantry arrives within a certain distance of the defender's position. The Germans (par. 446 I. D. R.) fix this point at 300 m. from the enemy, and the French, whose guns have a flatter trajectory, fix it at 500 m. In attacking a hill position, when the fire is well observed, the distance of this point from the position will be considerably greater.

"But, no matter where the actual location of this point may be, skillful infantry will start its assault very close to the point fixed by the regulations, and never beyond it, so as to avoid interfering with the fire of its artillery. Under such circumstances, it may be a skillful move for a defender who is still full of fight, to decrease the distance which separates him from the hostile infantry, in order that, by so doing, he may escape from the hostile artillery fire and from the smoke which obscures his vision. If he finds cover farther to the front, so much the better, for he will then have that much of an advantage over the attacker."

The weakness of most defensive positions lies in the danger of a sudden attack being directed against a flank. The assailant will endeavor to avoid making an attack against the front of a position prepared for defense, when such an attack has small chances of succeeding, and seek the decision by attacking a flank, where conditions are, to a certain extent at least, equalized. The danger of a flank attack increases with the length of the defensive line. It is by no means a good move to prolong the threatened wing (French VIth Army Corps at St. Privat) for the purpose of warding off an envelopment. The power of extension is bound to reach a limit sooner or later, and the wing attacked will then be so weak and attenuated that it will not be capable of offering serious resistance.

To ward off an envelopment by refusing a flank likewise promises little success. The enemy's superiority of fire will make itself felt, first of all, at the salient thus formed (see p. 357 supra), and his convergent artillery and infantry fire, which may even enfilade parts of the line, will paralyze all tactical movements of the defender at this point.

By prolonging the line and by refusing a flank, we only postpone the decision a little while, but cannot effectively cope with an envelopment. This must be accomplished in a different manner.

The best scheme would be to flank the enemy's enveloping force by posting an echelon in a suitable position, or to bring about a decision by employing the reserve offensively. However, for carrying out these measures, more time is required than for merely refusing a flank. Time may be gained by making an extensive reconnaissance on the flanks with strong detachments, and by occupying supporting points lying on the flanks, which the enemy would have to take before he could think of attacking the main position.

In employing machine guns in defense, it should be borne in mind that they are unsuited for carrying on protracted fire

fights, and that the mobility of the machine gun batteries cannot be utilized when, from the very start, they are assigned a section to defend.

In general, it will be advisable in defense to keep the machine guns at first with the reserve, and to employ them, when necessary, to reinforce the defensive line at threatened points, to prevent envelopment, to repulse an assault, or to participate in an offensive movement.

This does not preclude their coming into action at the very opening of an engagement, for instance, where it is necessary to command important avenues of approach.

When a withdrawal under cover is assured, it will also be possible to post machine gun batteries in such a manner, in front or on a flank of the main position, that they can bring a sudden fire to bear on the area in which the opponent will in all probability post his artillery.

Machine gun fire may sometimes be employed to sweep defiladed spaces in front of the defensive line.

If the direction of the hostile attack is known, the occupation of the position should not be longer deferred. It is always risky to occupy the position in the face of hostile batteries, especially as the fire of the defender's guns is masked by the skirmishers moving forward. If the defender can manage to give the attacker the impression that the position is still unoccupied, perhaps thereby inducing him to advance less cautiously, and then surprise him with fire, a depressing moral effect far exceeding the material success may be counted upon.* The firing line should be made so strong that the fire fight will have a chance of succeeding. A gradual launching of the troops should not be decided upon, as the losses are comparatively insignificant in defense, and as it is important to develop

*Engagement at Modder River, on November 28th, 1899. Engagement at Colenso, on December 15th, 1899.

a heavy fire so as to make it difficult for the enemy to gain the fire superiority. The principles governing the moment for opening fire have already been discussed (pp. 147 and 154 supra).

The enemy must be prevented from gaining the superiority of fire. This should be accomplished by concentrating the fire from a large number of rifles upon the parts of the enemy's force in motion. The defender should make the most of the advantage which his preparedness gives him. The attacker's firing line with its supports forms the target. A departure from this rule is in order, in the case of a French assailant, as the latter places the bulk of his force in the reserves and not in the firing line. It will frequently be practicable for the defender to discontinue his fire and to take cover when the assailant lies down and fires; but, while under cover, everything should be prepared for resuming the fire when the enemy rises to continue his advance (p. 156 supra).

If it has been found impossible to prevent the enemy from reaching the extreme limit of short ranges, the commander must decide whether to continue the fight until a decision is reached, or whether to break off the action.

When the opponent has entered the zone of short ranges, it will be too late for the defender to retire, unless the terrain in rear of the position is especially favorable, or other troops can take a hand in the fight to cover the withdrawal. The onrushing assailant is received with accelerated fire; the defender fixes bayonets, determined to risk a fight at close quarters. "The defender who does not fix bayonets is already casting furtive glances towards the best line of retreat."

While repulsing an assault, it would be a good plan for the defender to step upon the rear wall of the trench so that the latter would become an obstacle for the attacker. But this scheme can only be employed when the troops are completely in hand.

While the fire of the defender is increased to the utmost intensity by the entrance into the fight of all the supports, the

general reserve, which now takes a hand in the fight, seeks to bring about the decision by advancing to attack. On arriving close enough to assault, the attack reaches its most critical stage, and even a counter-attack made by a comparatively small force may turn the scale in favor of the defense.

5. THE COUNTER-ATTACK.*

In large engagements, the great power of resistance possessed by well posted bodies of troops will often determine the commander of the force on the defensive to contain the enemy at one point with a strong defensive position, while at the same time assuming the offensive at another. (This was planned, but not carried out, at Dresden, in 1813, and at Troyes, early in February, 1814; carried out with success, in Lee's operations around Richmond, during the latter part of June, 1862, and on the Lisaine in 1871; and miscarried on the Shaho, because Kuropatkin made his decision dependent upon reports in regard to the position of hostile reserves, which were non-existent in reality). Whether the offensive should be assumed while the enemy is still in the act of deploying,† or whether one must be satisfied with assuming the offensive at the last moment, is best determined by the relative strength of the opposing forces. When battle-fronts are short this may still be advantageous, but when the lines are long, a counter-attack can affect only a small part of the assailant's line, while the major portion thereof successfully pushes the attack home. Then the position and the day will be lost anyway, in spite of a local success.

The initial measures taken assure freedom of action to the defense, but the commander must not await exhaustive messages. Prompt action is necessary, either for throwing back the advanced troops of the assailant, or for striking a

*See F. C. v. H. *Zum Studium der Taktik*, p. 418 et seq.

†Rossbach, 1758; Austerlitz, 1805 (*Schlachterfolg*, p. 28); Salamanca, 1812.

blow at the hostile flank. In the latter case, it is an advantage if only weak reserves are struck, but hostile forces making a turning movement may also be encountered, and the commander will have to decide whether to deploy quickly and assail the enemy, or whether to take his chances in a rencontre.*

Even a success gained at a tactically unfavorable point will make itself felt, if it is won early enough and if the most is made of it. As a rule, tactical considerations determine where the commander should launch his reserves for the counter-attack.

The counter-attack here meant is an act of the commander of the whole force; in bodies of troops acting as part of a larger force and in numerically inferior forces, the warding off of the flank attack remains almost always the only remedy.

"The general reserve should be posted at the point from which it can best move forward, counter to the probable direction of the hostile attack, while, at the same time, making the most of the features of the ground. When only one flank is secure, the general reserve is, as a rule, placed in echelon in rear of the unprotected wing. When both flanks are in the air, nothing remains but to place sufficient reserves in readiness in rear of one flank to ward off a hostile envelopment, while retaining as strong a force as possible in rear of the other for the purpose of bringing about the decision. The echeloned general reserve must have room for development, whether this be for warding off a hostile envelopment or for making a counter-attack. (Par. 410 German I. D. R.).

The general reserve should be posted in rear of the center of the position only when the front is short and the situation is not as yet cleared up. In this position it will frequently be exposed to the fire directed against the first line, and its entry into action will usually involve a loss of time. When adequate information is available of the measures taken by the opponent, or the nature of the ground compels him to direct

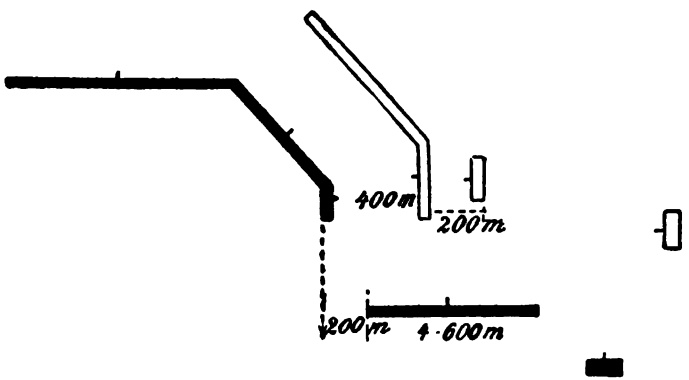
*The advance of Memerby's Brigade during the battle of Noisseville. KUNZ, *Noisseville*, p. 41.

his decisive attack against a wing, this alone determines the position of the general reserve.

Since the counter-attack is to take the enemy by surprise, the position of the general reserve must be concealed, and precautions must be taken to keep hostile patrols in the dark, as long as possible, in regard to its actual location. The ground over which the general reserve is to advance should be free from obstacles, so that the counter-attack can be made rapidly and with uniformity.

Since the assailant will almost invariably endeavor to direct his attack against a flank, the general reserve of the defender should be posted at such a distance in rear of the threatened wing that the troops composing it will be sheltered to some extent from hostile fire. In order that the fully deployed general reserve, when making a counter-attack, may clear with its inner flank the outer flank of the line holding the position, and not get into the latter's zone of fire, a sufficient interval must be left between the two. This interval should increase with the size of the reserve. As a rule, the counter-attack should be launched so as to produce the decision when the assailant has arrived within assaulting distance of the defender. This requires that the general reserve and the line holding the position be separated by an interval of at least 200 m. In addition, the counter-attack must be so made that it will actually strike the assailant in flank; and this it cannot do unless the general reserve is posted sufficiently far to a flank. The center of the reserve should be launched so as to strike not only the flank of the enemy's firing line, but that of his supports as well. If the general reserve is posted too near the first line, there is danger of it being enveloped together with the first line, and committed to purely defensive action (refusing a flank). On the other hand, if it is posted too far to a flank, its timely entry into action is not absolutely assured; the assailant may turn against it, cut it off from the defensive position, and defeat it in detail. The farther the general reserve is off to a flank, the more effectively will it strike the

enemy in flank, but it will be correspondingly more difficult to conceal it. The necessity of pushing the general reserve far to a flank decreases, as the scope of the attacker's envelopment of the defensive line increases. It may frequently be to the defender's advantage to induce the assailant to make a far-reaching envelopment, provided the line defending the position is not placed in an unfavorable tactical situation by so doing.



Since the attacker will probably have detachments echeloned in rear of his flank, the troops entrusted with the counter-attack must similarly have an echelon in rear of their exposed flank in order to protect themselves against a flank attack.

It is impossible to lay down a fixed, normal strength for the reserve. This depends upon the strength of the position, and the degree of resistance the intrenchments are capable of rendering; but, in any case, the force intended for local defense should be strong enough to compel the enemy to deploy completely, and prevent his carrying the defenses before the counter-attack is made. Large quantities of ammunition and intrenchments capable of rendering effective resistance must compensate for the shortage of men in warding off the enemy, in order that the general reserve may be made as strong as possible. The question, as to how thinly the position must be occupied, and how strong the general reserve may be made, can only be answered in each particular case. If the attack

made by the general reserve is to produce any effect, it must not be undertaken with too small a force, as it could then be checked by weak detachments.

While the general reserve lies in waiting for the enemy, it may either—

1. Remain in a preparatory position, in one or more groups, and deploy during its forward movement; or

2. Take up the attack formation from the start.

The first method has the advantage, when the space required is small, of permitting the general reserve to be concealed, and allows changes to be made in the direction of march and in the dispositions.

The second, although it enables the reserve to advance promptly to the counter-attack, is rarely suitable, as the reserve in combat formation is not so easily concealed, as it is more difficult to make changes in the dispositions and the direction of march, and as this formation seems only practicable for making an advance in one direction—straight to the front.

It is of the utmost importance to know when the counter-attack should be launched. In warding off the enemy by purely frontal action, no special disadvantages result from prematurely launching the general reserve; if it enters the action too late, it will still be able to throw back the assailant who has penetrated into the position. With the counter-attack it is different; it must take place when the opponent is under the most effective fire at short range. If the counter-attack is made prematurely, especially when the reserves and flank echelons of the attacker have not as yet been used up, the latter, while, indeed, exposed to the most violent fire of the defender, will be able to take counter-measures. In that case, two entirely independent actions may result, and the counter-attack made by the general reserve may be checked by the retained echelons of the attacker and repulsed by their fire. When launched prematurely, the counter-attack will not always repulse the hostile attack; and when launched too late, it may perhaps

still bring about the decision, or avert a defeat, but it will never produce decisive results.

A counter-attack made after the attacker has penetrated into the position, and while he is endeavoring to dislodge the garrisons of such supporting points as still offer resistance, reckons with the fact that the hitherto victorious assailant, exhausted and in confusion, will not be a match for a well aimed blow delivered by a considerable number of troops. However, a defender will scarcely contemplate such an employment of his general reserve; for him the important thing is to repulse the attack in front of and not within the position. Although military history presents comparatively numerous instances of such *retours offensifs,* this may be explained by the fact that the counter-attack was launched too late. The weakness of the assailant is but momentary, and the most must be made of this by advancing against him promptly by the shortest line. But if the assailant has had time to re-form and to bring up his batteries, it will usually be too late to make a counter-attack.

Aymard's Division (French), which had penetrated into **Servigny** under cover of darkness, but had made no attempt to occupy the town systematically or to re-form the disordered troops, was driven out again by a counter-attack made by only eleven Prussian companies.*

The numerous counter-attacks made by the French during the battle of **Wörth** (for example the counter-attack made by Maire's Brigade) pushed too far forward into the zone of the German artillery fire, and did not have the expected success. The well-led French counter-attack made by about 1200 men from the south edge of the **Niederwald,** was discontinued at a timely moment.† The well-directed counter-attack made by the 1st Turco Regiment at **Wörth,** after the capture of **Elsasshausen,** was successful and is especially instructive.‡ The attack made by General de Sonis for the purpose of retaking **Loigny** was undertaken too late and with inadequate forces.¶ The same is true of the counter-attack made by the 3rd Bavarian Division on **Zella** (4th July, 1866).

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*KUNZ, *Noisseville,* p. 52. *Das Wald und Ortsgefecht,* p. 181.

†KUNZ, *Kriegsgeschichtliche Beispiele,* XIII, pp. 75 and 159.

‡*Ibid.,* XVI, p. 187, et seq.

¶HÖNIG, *Volkskrieg,* IV, p. 124.

The French regulations recommend a unique procedure, which may be successful when employed against an opponent not prepared to meet it. "Under certain circumstances, counter-attacks may be combined with retreat maneuvers. The advanced troops should bring the enemy to a standstill with their fire and compel him to deploy. Then they should break off the action without becoming involved in a fight at close quarters. In this manner, the attacker is drawn onto terrain reconnoitered beforehand, where fresh troops, hidden up to the last moment, attack him impetuously under favorable conditions at a time when he is tired and worn out by a long movement."

The most difficult thing about a counter-attack is to seize the right moment for launching it. As it is impossible to foretell how long it will take the enemy to arrive within assaulting distance, no rule can be laid down as to the proper moment for launching the counter-attack. The best plan would be to screen the movements of the reserve, and, as the attacking troops approach, to bring it gradually up to the point from which it is to move forward. A commander requires wide practical experience and great force of character to judge the situation calmly and dispassionately, while fully aware that launching the counter-attack either too soon or too late may prejudice the result. There is always danger that the suggestions which reach him from various quarters may cause him to take half-measures. The stronger the general reserve and the weaker the force holding the defenses, the more numerous and urgent will be the requests for support; and he will not find it easy to resist the temptation to grant these requests and accordingly weaken the general reserve, which is intended for offensive action.

We must now consider the question as to whether the counter-attack should rely on fire action alone, or should resort to the bayonet as well. The unexpected advance of a large body of troops against a flank of the enemy will rarely

fail to produce an effect. If the enemy does not yield to fire, it is obvious that an assault will have to be made. A counter-attack made unexpectedly is, as a rule, successful at the start; but, if its commander follows up this initial success when not supported by strong reserves, a reverse may take place resulting in the defeat of the defender's entire force.

A counter-attack made by three companies (9th, 10th, and 11th) of the 3rd Bavarian Infantry Regiment brought relief to the two batteries which had gone into action near **Goury** (battle of **Loigny**). The Ist and IInd Battalions, 3rd Infantry, the Ist and IInd Battalions, 12th Infantry, and the 7th Jäger-Battalion joined in this attack, and when the batteries finally followed, the force succeeded in throwing back the French battalions immediately opposing it. The twenty-one companies now made the mistake of attacking **Ecuillon,** which they occupied. The attacking force had traversed about 2000 m., and as there were no reserves and flank echelons, the Bavarians were obliged to give way before an assault made by seven fresh battalions against their unprotected left flank. The mistake of pushing forward too far, and the lack of supports in rear of the exposed flank, was bound to exact a penalty, as soon as the French were in a position to advance on their own account.*

A very instructive episode occurred on August 26th, 1904, near **Tsinortun.** Toward noon the Japanese Guard and the 10th Division advanced through fields of tall kaoliang for the purpose of enveloping the right wing of the IIIrd Siberian Army Corps. The commanding general, Lieutenant-General Iwanov, directed the reserve (apparently parts of the 3rd East-Siberian Rifle Division) to make a counter-attack against the left flank of the Japanese. The Russian counter-attack was taken in flank by a brigade of the Guard, which followed in rear of the Japanese attacking force, and had to retire. The decision was then brought about by the counter-attack made by the 140th Infantry, which unexpectedly appeared on the left flank of the Japanese. The engagement at Tsinortun is moreover of special interest as regards the Japanese method of attack.†

So far we have only considered the counter-attack made against the flank of an attacker, and against the front of an enemy who has victoriously penetrated into a position. The success of a counter-attack against the enemy's flank depends primarily on moral factors; besides, after protracted

*HÖNIG, *Volkskrieg*, IV, p. 43.

†LÖFFLER, *Allgemeine Lage*, I, pp. 68 and 69. v. HOEN, *Der russisch-japanische Krieg*, in *Organ des militär-wissenschaftlichen Vereins*, p. 166. NIESSEL, *Enseignements tactiques*, p. 158.

fighting, supports and reserves in rear of the flank are frequently lacking, so that the attacker cannot quickly form an adequate firing front towards a flank.*

Theoretically, a frontal counter-attack, *i. e.*, one made straight to the front from a position, while the assailant is advancing to the assault on a broad front, ought to offer the least chances of success, but military history proves the contrary in those cases where the defender awaited the proper moment. This moment arrives when the defender clearly perceives that the enormous losses suffered by the attacker begin to impair the morale of his remaining men. This becomes apparent through a slackening in the attack, through an uncertainty of movement, and, finally, through hesitation, the latter being usually preceded by wavering.†

The moral effect of a determined counter-attack with cold steel during the closing moments of an attack will undoubtedly be great. Meckel says‡: "Here likewise, it is of the greatest importance to bring up the supports promptly, so as to increase the volume of fire to the utmost and to produce that superiority which quite naturally resolves itself into an offensive movement. The defender who does not fix bayonets is already casting furtive glances towards the best line of retreat."

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*Examples of successful counter-attacks against an enemy's flank: Battle of Loigny, on December 2nd, 1870; the counter-attack made by 21 companies of the 4th Brigade at Goury (HÖNIG, *Volkskrieg*, IV, p. 55), and that made by the Ist Battalion, 10th Infantry, and the Ist and IIIrd Battalions, 13th Infantry, at Goury (*ibid.*, p. 41); the flank attack made by Kottwitz' Brigade (*ibid.*, p. 82, and p. 220 supra); the flank attack made by the garrison of Fougeu on the attacking columns of General Sonis; the brilliant flank attack made by the IIIrd Batallion, 90th Infantry, during the battle of Orleans, on December 4th, 1870 (KUNZ, *Orleans*, p. 148); and the counter-attack made by General Bataille on the Stiring Wald during the battle of Spicheren. The last-named counter-attack is a good model, both as regards conception and execution. (*Wald und Ortsgefecht*, pp. 93 and 96).

†"The defender will only be able to make a frontal counter-attack from his position when he has repulsed the assault and has made the most of fire action, or when it is important to drive away the enemy who has been brought to a standstill in front of the defender's position. A premature counter-attack may lead to the loss of the position." (Par. 414 German I. D. R.).

‡ *Lehre von der Truppenführung.*

This "superiority" caused the French to advance from the wood of **Elsasshausen** against the skirmishers of the XIth Army Corps appearing at the northern edge of the **Niederwald.** The success they met with at the start induced the French to continue their advance, and when a reverse occurred subsequently, the wood of Elsaszhausn was taken by the Hessians without difficulty.*

Although such counter-attacks, directed against the strong firing line of the attacker and unsupported by the defender's fire, were frequently successful in war, this was due to the moral effect produced on the attacker by the sudden and unexpected onset of a long line of infantry. Troops thus unexpectedly attacked, and, in addition, deprived of the support of their own artillery, almost invariably lost their heads. However, if the attacker is prepared for such an event, remains cool, meets the counter-attack of the defender with a powerful fire at short ranges, and brings up his supports, in order to follow up the effect of his fire with an offensive movement, there can be no doubt as to the result.†

Such a counter-attack, however, is only possible when the defender still has strong, intact reserves at his disposal, which he has kept in readiness in the closest proximity to the firing line until the decisive moment. An organization acting as part of a larger force, and whose flanks are secure, as a rule has no choice but to make a frontal counter-attack, unless offensive action is to be dispensed with altogether.

Short frontal counter-attacks from a position were made successfully by the British in the battles at the opening of the 19th Century. (In these counter-attacks, the British fired a volley and then advanced to the assault). Such successful counter-attacks were made during the battles of **Vimiero, Maida, Busaco,** and especially **Waterloo.**‡

At **Beaumont,** the 66th Infantry made a counter-attack when the French had approached within 40 m. The 66th had already begun to

*KUNZ, *Kriegsgeschichtliche Beispiele,* XIII, p. 121, et seq.

†The battles of Soor and Kesselsdorf are interesting examples of this. (*Kriege Friedrichs des Grossen,* II, pp. 75 and 234). In both cases the defender's frontal counter-attack forced the assailant to face about; but at Soor a second line of infantry, and at Kesselsdorf a charge made by the Bonin Dragoons finally turned the scale in favor of the assailant.

‡At Waterloo, the counter-attack made by Picton's Division and the British Guards repulsed the French attack. VON OLLECH, *Feldzug von 1815* pp. 230 and 247. See also note p. 151 supra.

waver, here and there, when its energetic and unexpected advance caused the French to retire.*

In the battles of the **Russo-Turkish war of 1877-78,** frontal counter-attacks were successfully made in several instances.

In the engagement at **Kazeljevo** (5th September, 1877), the frontal counter-attack made by the Russians, who were numerically far inferior, saved them from defeat, as all their lines of retreat were obstructed by their trains, which had gone astray.†

The most instructive fight in this connection is the engagement of **Gorni Bugarov** (1st January, 1878). General Weljaminov's detachment, which consisted of the Pensa and the Tambov Infantry Regiments, occupied a flank position on the southern foothills of the Balkans, on the road leading from **Orchanie** to **Sofia.** The Russians allowed the Turks to approach to very short range before they opened fire, which was immediately followed by a counter-attack all along the line. This seems to have been the result of the initiative of the several battalion commanders. The Turks (15 battalions) faced about and retired on Sofia. The Russian infantry was led back to its first position.‡

On the same day, the attack made by the Preobrajenski Regiment of the Russian Guard at **Tashkessen** was repulsed by the frontal counter-attack made by a weak force of Turkish infantry.¶

During the Russo-Japanese war such frontal counter-attacks were very frequently made. When undertaken with inadequate numbers, they were invariably repulsed by the fire of the Japanese, especially when the latter found cover in previously constructed trenches.

Provisions of Various Regulations.

Austria-Hungary. If a counter-attack is contemplated, the commander should resist every temptation to employ parts of the general reserve for other purposes than for carrying out that attack. In this case, the general reserve should be placed in readiness so that, while the opponent advances within the decisive zone, it can quickly deploy and carry out the counter-attack with determination by directing a powerful fire against the flank of the enemy. Freedom of movement on one flank is absolutely essential to the execution of the counter-attack. Local frontal counter-attacks are to be avoided; the enemy is to be annihilated by fire.

When it is not contemplated to make a counter-attack with the general reserve, the latter is to be employed either for directly reinforcing the troops in one of the sections, or for engaging the hostile troops making an enveloping attack on the position.

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*HOFFGARTEN-HEIDLER, *Beaumont,* p. 53.
†SPRINGER, *Der russisch-türkische Krieg,* III, p. 171.
‡*Ibid.,* VII, p. 184.
¶BAKER-PASHA, *War in Bulgaria,* II, p. 57.

France. The regulations make a distinction between counter-attack (*contre attaque*) and offensive return (*retour offensif*). A counter-attack is made by the reserve before the enemy penetrates into the energetically defended supporting points. In contrast herewith, every attempt to retake a captured position is called an offensive return.

A counter-attack with troops of the second line is to be made as soon as the assailant presses the fighting line too closely. A powerful and suddenly executed counter-attack, supported by the fire of the first line, will, at the very least, check the enemy until the fighting line has had time to recover.

Occasionally, it may be advantageous not to await the crisis, but to force the assailant to deploy by directing a heavy fire upon him, then to break off the action, inducing the enemy to press on, in order to draw him, by this means, onto previously selected and reconnoitered terrain, where he is suddenly attacked in flank by fresh troops. Military history shows that this very procedure has frequently been successful. "If the attacker presses forward too hastily and if he threatens to carry the defender's position, fresh troops, which have been assembled in a place sheltered from view, attack him energetically, while the troops already engaged increase the intensity of their fire. This powerful and energetic counter-attack produces confusion in the enemy's ranks and compels him to retire, or at least to discontinue his forward movement until he has had time to recover."

"The same activity, the same determination to maneuver, must prevail everywhere. Every mistake and every weakness of the enemy must be quickly perceived and promptly utilized. The troops in the counter-attack should move forward without hesitation and regardless of the cost. When such a forward movement has to be discontinued, the commander must decide where it shall cease. The efforts of all should be directed toward one object, that of tiring and demoralizing the enemy by constant counter-attacks, until the moment arrives when the commander must order the offensive to be assumed."

England. The counter-attack may be made either by the garrison of the firing trenches, as a frontal counter movement, or by the general reserve, accompanied by artillery and cavalry, as a decisive counter-attack. The moment when the attacker has used up his reserves and is about to assault is generally considered as the most propitious for making the counter-attack.

Japan. The Japanese entertain the same views as the Germans. "The better the position, the location and construction of the intrenchments, and the distribution of troops, the greater the number of men that can be saved in garrisoning the position, and the stronger the general reserve available for an offensive movement. By this means the chances of victory are increased. * * * Frequently there is danger that the defender will be committed to purely passive defense, and that freedom of action will be lost. Therefore, when the proper moment arrives, the decisive counter-attack should be made."

XII. THE RETREAT.

(Par. 426 German I. D. R.).

A retreat under effective hostile fire means annihilation; only the presence of cover immediately in rear of the fighting line should induce a commander to come to the weighty decision of reaching it by running. (Russia). On account of the great range of modern weapons, defeated troops, on open ground, cannot escape from fire by running.* No rules can be laid down in regulations as to the conduct of a retreat after a defeat. As a rule, further resistance is no longer possible; neither is it practicable to leave some troops in position to cover the retreat. The defeated force must retire in a direction perpendicular to the front of the enemy,† and cannot re-form until the fire of the opponent ceases or at least abates. (Par. 428 German I. D. R.). Artillery which is moved to the rear at a timely moment, and all available cavalry should cover the retreat of the infantry, so as to prevent the hostile cavalry from making the most of its opportunities for effective action.

To order a retreat at the right moment requires military instinct; rules cannot be laid down in regard to it.

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*Furthermore, the danger of panic should not be underestimated. See KUNZ, *Kriegsgeschichtliche Beispiele,* XIII, p. 49, and XVI, p. 243, in regard to the panic created in a skirmish line near the Bruch Mühle west of Gunstett (Wörth). This skirmish line was running to the rear toward a rallying position and the panic was produced by the command "To the rear, Double Time! March! March!" The panic was nipped in the bud by the energetic action of a mounted field officer, Major v. Below.

†The 57th Infantry, whose right flank had been enveloped and roughly handled by a counter-attack made by the French, retired to its left rear through the fragments of the 16th Infantry. This caused the two regiments to change places. (The attack made by the 38th Brigade at Mars-la-Tour). *Kriegsgeschichtliche Einzelschriften,* 25, p. 35.

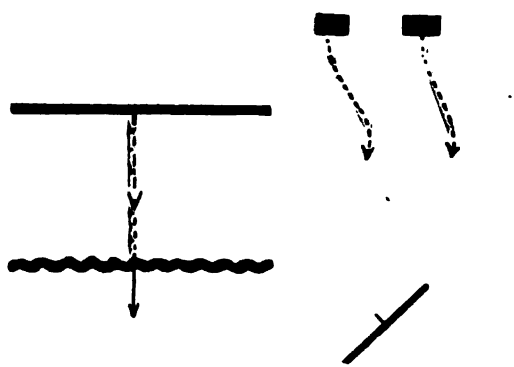
"Troops which, while engaged with the enemy, are either withdrawn by order or defeated, can no longer choose their line of retreat. If the enemy pursues, they must retire perpendicularly to their former front, without changing formation, and need a force on which they can rally in order to prepare for renewed resistance. From this it follows that a systematic retreat can only be carried out when the force still has some distribution in depth. It would be wrong however, for a force intended for decisive action to retain a reserve for covering the retreat instead of employing it for the purpose of gaining the victory."

To break off the action by systematically relieving the troops engaged with the enemy,* is only possible if the force still has reserves available, if cavalry and artillery are in a position to take a hand in the fight, or if the troops that have been withdrawn are sheltered from the enemy's fire by features of the ground—all of which depends in many cases on chance.

It is much more difficult to break off an action in defense than in attack, as in the former case, the assailant approaches closer with every moment. This brings up the question, as to whether it would not be better for the defender to hold out until darkness sets in than expose his troops to the incalculable results of a retreat under fire. When the assailant has once entered the zone of short ranges, the defender will no longer be able to effect a systematic retreat. If the defender has used up all his reserves, the withdrawal should be begun at the point where the enemy is not pressing his attack, or where he has been unable to gain a superiority of fire. When a withdrawal is made, the whole local front should retire at once and simultaneously; it would be a mistake to reduce gradually the strength of the units engaged, for this would only give the enemy an opportunity to annihilate completely the remaining parts. If a company cannot maintain its position, a platoon certainly could not do so.

*Taktik, V, p. 344.

As soon as the commander decides to break off the action, the reserve, if one is still available, should be sent to the rear to take up a rallying position, which should be so situated that it can make its influence felt as soon as the main position is evacuated. As every defeated force, or one that is withdrawn by order, retires straight to the rear, the rallying position, in order to allow the troops holding it to fire effectively, must be located as far as possible to a flank of the line of retreat. If the outer flank of the position can be advanced, fire may be opened at an earlier moment, but this will only be practicable in minor engagements. The distance of the rallying position from the main defensive position should be such as to compel the enemy to advance again under fire, and prevent his carrying both the main defensive position and the rallying position at one rush. On the other hand, the rallying position should not be so far to the rear that the retreating troops may be annihilated before they enter its effective zone. However, as the troops in the rallying position are also to effect a withdrawal, it is not a good plan for them to engage the enemy from the start at too



short a range. "It is most desirable when artillery and machine guns supported by cavalry suffice for this purpose, while the infantry uninterruptedly continues its retreat. The mounted arms follow later at an increased gait." (Par. 429 German I. D. R.).

The rallying position should be occupied in time, so that all dispositions for holding it can be made calmly and without precipitation. A powerful fire at mid and long ranges is requisite to prevent the enemy from reaching decisive ranges. The firing line should, therefore, be strong and the supports weak. If a reserve is still available, it is at once sent back into a second rallying position, to cover the withdrawal of the troops occupying the first rallying position. A free field of fire down to the shortest ranges is not necessary. If the position is on elevated ground, the firing line should be posted so far in rear of the crest that, while its fire can still sweep the ground at mid ranges, and perhaps at the extreme limit of short ranges, the skirmishers, on retiring, will be sheltered as soon as possible. Fire should be opened as soon as possible, in order to retard the enemy's advance.

The troops holding a rallying position should delay the enemy's advance long enough to give the retiring force ample time and room to re-form, so that it can effect its retreat in good order. When this has been accomplished, the troops occupying the rallying position retire, unless there is hope that fresh troops may bring about a change in the state of affairs. As a rule, a second rallying position will be necessary, but it would be a mistake to halt in every seemingly favorable position. When a retreat has once been decided upon, it is generally necessary to get away from the enemy as quickly as possible.

"The commander must conduct the combat attending a retreat according to a well-ordered plan. He must indicate where the rallying position is to be, what troops are to occupy it, and assign march directions to the different columns. Only after he has given these orders and has assured himself that they will be executed, does he leave the battlefield, in order to meet his troops soon thereafter with new orders.* The rest is the business of subordinate leaders."

*This sentence in our regulations, not to be found in those of other armies, was necessary to absolve a superior commander from all blame for leaving his troops and the battlefield. v. SCHLICHTING, I, p. 115. See *Taktik*, V, p. 350.

(Par. 432 German I. D. R.). The latter remain with their organizations for the purpose of maintaining order and cohesion. (Par. 297 German I. D. R.). Adjutants and officers detailed to receive orders should be sent to the rear ahead of the troops.*

*For the conduct of a retreat, see *Taktik*, V, p. 373, et seq

XIII. CONTAINING ACTIONS.

THE DELAYING ACTION AND THE HOLDING ATTACK.

Since the attacker will invariably seek to overpower the defender, and the latter will endeavor to prevent this by force of arms, it is obvious that an enemy can be "delayed" or "held" only when he permits this to be done. It is difficult to conduct a delaying action or a holding attack, because our training, which is based on offensive action, causes subordinate leaders to follow up every little advantage. In delaying actions, the defensive, and in holding attacks, the offensive intention predominates. The latter may consist of merely threatening the enemy with an attack, or of seriously engaging him. (Par. 392 German I. D. R.). Both the delaying action and the holding attack aim at deceiving the enemy.* Accordingly, the characteristic features of these combats are great frontage, large expenditure of ammunition, and long range fire, but, at the same time, few rifles, in order to deceive the enemy as to the strength of our force. In both combats, troops require considerable distribution in depth. The object of a delaying action is to gain time until the troops in rear can deploy, neighboring columns can come up, or a turning movement can become effective. (Par. 417 German I. D. R.). Troops fighting a delaying action require considerable distribution in depth so that they can effect a withdrawal. Distribution in depth is

*This is still more pronounced in demonstrations. (*Taktik*, V, p. 11) "Feints are to deceive the enemy as to our intentions, but they may consist of offensive action. The regulations do not lay down specific rules either for them or for other more rare methods of combat; accordingly, their conduct will vary with the situation." (Par. 420, German I. D. R.).

still more necessary in a holding attack,* in order that the troops may be able to repulse a counter-attack made by the enemy, or, by attacking him energetically, prevent his withdrawing. A force fighting a delaying action should keep its supports far to the rear, while a force charged with holding the enemy should keep them in close proximity. By properly employing his artillery, the commander can best exercise an influence on the course of the combat. (Par. 419 German I. D. R.). Since a delaying action is to be fought at long ranges, a field of fire is only required at those ranges; defiladed spaces in the foreground may frequently be a positive advantage. The fire fight is kept up only so long as it is necessary to keep the enemy at a distance. In a holding attack, it will not be proper to keep up a continuous fire; the violent fire breaking forth from time to time must teach the defender that a force is lying in waiting opposite him, ready to rush forward at a moment's notice.

The object of threatening with an attack may frequently be accomplished by engaging the enemy with several detachments which are separated by intervals. (Par. 288 German I. D. R.). The negative object of preventing the enemy from withdrawing may be accomplished with a weak force; the positive object of compelling the enemy to use up his reserves in the early stages of the fight and at a less decisive point, requires that he be engaged with a stronger force. A determined commander will not allow himself to be held by demonstrations. The manner in which the Vth Army Corps forced the French to bring up their reserves into the first line at Wörth, is worthy of imitation.

The size of the group charged with holding the enemy depends upon the extent of front to be covered and the probable duration of the combat. The conduct of such a force will vary considerably, depending upon the distance to the point where the decisive action is to be fought. When

*_Taktik_, V, p. 161.

the holding force is close to this point, it should engage the enemy energetically.

England. The holding attack is to deceive the enemy as to the direction in which the main attack will be made, and, when the crisis of the action approaches, prevent his withdrawing troops from those parts of his front which are only threatened and opposing the decisive attack with nearly his entire force. Accordingly, the troops making the holding attack should act vigorously, as soon as the attack develops, and be in readiness to transform their demonstration instantly into a real attack.

XIV. THE INFANTRY COMBAT ACCORDING TO VARIOUS DRILL REGULATIONS.

THE AUSTRIAN DRILL REGULATIONS OF 1903.*

ATTACK.

Both the rencontre and the attack on a position prepared for defense are considered. The regulations in regard to the rencontre have been revised, so as to permit a commander to launch the battalions of his main body directly from route column, or to concentrate his main body farther to the rear, while his advance guard stands on the defensive. The **attack on a position prepared for defense,** even after the attacker's artillery has succeeded in paving the way for its infantry, consists of a laborious advance from one firing position to another. The question as to whether an attack is feasible without the support of artillery fire, is answered to the effect that it will, as a rule, be a difficult undertaking, unless the artillery has sufficiently silenced the batteries of the defender. The regulations divide the attack into two clearly defined phases, viz., the advance to the decisive firing position (the main firing position), and the decisive action.

The provisions of the regulations coincide very nearly with the views considered sound in Germany, and therefore an attempt will here merely be made to point out several differences. The combat formation necessary for the decisive stage of the action is taken up during the preparatory stage, so that, when the forward movement commences, the troops need only move straight to the front. (Par. 568). In a division, by appropriately combining "tactical units", echelons are formed, whose strength depends upon the purpose of the combat, the information of the enemy, and the relation of the division to other bodies of troops. (Pars. 533, 540 and 541). Rules for the employment of thin or dense firing lines are not given. "The attacker should advance impetuously to the point where he can employ his rifles effectively." (Par. 582).

"In an attack, everything should be done to get within effective range of the opponent before fire is opened by the whole line." (Par. 323). When acting as part of a larger force, a platoon may open fire independently, if it suddenly encounters the enemy or if it finds a good opportunity

*The various provisions of the German and Austrian Infantry Drill Regulations are skillfully compared by Major-General REGENSPURSKY v. REGENY, Austrian Army, in an article entitled *Die taktischen Lehren des Exerzierreglements für die k. k. Fusstruppen vom Jahre 1903. Ein Vergleich mit dem deutschen Reglement 1906.* (*Militär-Wochenblatt,* 1906, Nos. 7 and 8).

for firing which the company commander has overlooked. (Par. 338). Unless the battalion commander has reserved to himself the right of designating the moment for opening fire, the company commanders direct when fire shall be opened, and conduct the fire fight at mid and short ranges. At long ranges, the battalion commander designates the companies that are to fire.

Kinds of fire. Fire at will and volley fire are employed. As a rule, volleys are only used when the troops are in close order, but may also be used in skirmish line to test the range. According to par. 331, the rate of fire may be accelerated, and in pars. 327 and 686, fire surprises are authorized.

When exposed to effective fire, the firing line is to **advance by rushes.** These are to be made by alternate units moving forward, supported by the fire of those remaining behind. Rushes are only in exceptional cases to be made by units smaller than a platoon. "The length of the rushes depends upon the character of the ground and the tactical situation, as well as upon the physical condition of the men. They serve as an expedient for reaching the next firing position." (Par. 313).

Movements under effective hostile fire may sometimes be made by **crawling.** This is considered especially useful in rectifying alignments. (Par. 196).

For **envelopment,** see p. 313 supra.

For the **use of the spade in attack,** see p. 398 supra.

Assault. "The close approach of a long firing line to an enemy who occupies a good position, may well pass as a proof of the assailant's superiority. Nevertheless, this does not, under all circumstances, furnish assurance that a forward movement for the purpose of penetrating the hostile position will now succeed; a premature assault may still result in disaster.

"As long as the conduct of the opponent does not show clear indications that his fire power is crippled, nothing remains for the attacker but to continue the fight for the superiority of fire. In doing this, the commander should not hesitate to put in his last man if necessary. The assault—in case the enemy still offers resistance—should not be made until the attack has been pushed sufficiently close to the enemy's position, and the power of resistance of the enemy is palpably broken.

"It is immaterial what formations are taken up for this closing act of the combat, as it should be the natural culmination of a situation strained to the utmost. The troops must understand that there is no longer any chance to go back; that on the contrary, at this moment, honor and salvation lie wholly in moving to the front.

"When the assault has once begun, the hostile position should be carried in one rush. Any hesitation or halting, at this critical stage of the action, may nullify the previous success, and must therefore be quickly

overcome by the reserves, if any are still available, taking a hand in the fight." (Pars. 590—592).

The decision to assault may emanate either from the firing line, from the commander of the whole force, or from the commander of one of the units. If the decision emanates from the firing line, all the troops are to conform to the movement of that line. The following provision, which applies even to a company acting alone, differs from the German regulations, viz., "During the assault, a part of the assailant's force should, whenever practicable, continue its fire and direct it upon any hostile reserves that may appear."

DEFENSE.

The regulations governing the **defense seeking a decision** differ but little from the views entertained in Germany. The actual work of preparing a position for defense is not to commence until the direction in which the enemy is going to make his attack is known. The assailant is to be prevented, as far as possible, from obtaining information of the position and the measures taken for strengthening it. This is to be accomplished by pushing small detachments to the front to hamper the enemy's advance.

In the past, **advanced positions** were decidedly opposed by the Austrians, but at present their use is recommended in cases where time is to be gained or the enemy is to be deceived, or where fire from such positions would inflict considerable losses on the enemy. However, the regulations seek to obviate the danger of the principal fight taking place in the advanced position instead of in the main position, by adding: "But such a measure should not cause the commander to swerve from the firm determination to carry out his original intention."

The tremendously increased fire power of infantry is to make it possible to hold the front with a comparatively weak force, while the remaining troops are concentrated as a reserve with which the actual decision is to be brought about. The commander should resist every temptation to use the general reserve for other purposes than for carrying out the **counter-attack,** which should be ordered when the assailant is under the most effective fire of the position. The general reserve should then be quickly deployed and should make its attack with determination, by directing a violent fire against the flank of the enemy. Local frontal counter-attacks are to be avoided. The garrison is only charged with the task of annihilating the enemy with its fire, which should be increased to the utmost intensity.

THE ITALIAN DRILL REGULATIONS OF 1903 AND 1906.*

ATTACK.

The peculiar character of the probable Italian theater of war in Upper Italy, with its numerous forests of tall timber, and its many defiles, causes special attention to be paid to the offensive.† The regulations emphasize the necessity of the coöperation of infantry and artillery.

Although the platoons intended for the firing line are brought up in close order formation, the actual combat formation is not taken up until the situation makes this necessary; but, in any case, the leading element is to enter the zone of hostile fire in a deployed formation. To neutralize the mixing of units as much as possible as the action progresses, the firing line is formed into groups separated by intervals of 4—5 paces, although this increases the casualties. These intervals may be increased, when required, to 10 paces. (Intervals between skirmishers in the firing line are usually at least 15 cm., otherwise 3 paces). The firing line is to advance until increased casualties force it to open fire.

Kinds of fire. Only fire at will is employed. (This is also used when the troops are in close order and formed in four ranks). The battalion commander in the first line directs that fire be opened, as soon as it is certain that a good effect can be produced. When two targets appear, the fire is to be directed upon the one promising the best results (*i. e.*, not necessarily the one that is tactically most important). "In order that the intensity of the fire may correspond to the requirements of the tactical situation existing at the moment, officers, by reason of their tactical training, should be able to state approximately how many rounds are necessary to produce the desired effect, the range, degree of visibility and character of the target, the nature of the terrain and of their position, as well as the physical condition and morale of their men being given. From these

*Major-General MIKULICZ RADECKI, Austrian Army, *Das neue Exerzierreglement der italienischen Infanterie*, Vienna, 1906. v. GRÄVENITZ, *Die neueren taktischen Vorschriften für das italienische Heer*, in *Vierteljahrsheft*, 1905, I, p. 90, et seq. *Der Infanteriekampf in der oberitalienischen Tiefebene*, in *Streffleur*, 1907, October and November numbers (also obtainable in special pamphlet form).

P. RATH, *Der Kampf in der italienischen Kultur*, in *Militärische Welt*, 1907, January-February number.

†Unless otherwise ordered, the advance guard advances against the hostile forces which it encounters in its march, whether its action be to determine, as quickly as possible, the strength of the opponent and to save its main body from an unnecessary delay, or whether it be to deceive the opponent as to the location of its own forces, or, in certain cases, to make the most of a surprise. (Par. 87).

estimates may be deduced how many rifles must be employed in order to bring about a decisive result in the shortest possible time."

The **advance by rushes** may be made either at a walk or at a run, but the regulations do not prescribe in detail how it shall be conducted. The following points are considered especially important: The time for making a rush, its length, and whether it should be made by a whole unit simultaneously or in echelon. All this depends upon various circumstances, which the leader, after due consideration of the terrain and the hostile fire, as well as of the physical condition and morale of his men, is to judge in each particular case. In doing this, he is to bear in mind that the rush must be made as unobserved by the enemy as possible, so that the latter cannot direct his fire upon the advancing unit.

The rushes are to be made first by those parts of the firing line which are favored by the terrain and which have gained a superiority of fire over the hostile troops immediately opposed to them. Units which could only advance by rushes at the cost of considerable and useless losses, are to wait until the neighboring units have pushed ahead, support these with their fire, and then advance in turn under cover of the fire of the others.

As a general rule, so long as the hostile fire permits, rushes are to be made by entire companies, or at least by whole platoons. The length of the rushes and whether they are made at a walk or at a run, depends upon the nature of the terrain. Upon completing a rush, fire is to be opened at once.

When the intensity of the hostile fire increases, or after the organizations have become mixed, rushes can no longer be made by entire units but only by squads or like fractions. These leave the firing line and endeavor to reach the next cover at a rapid run, or, if cover be lacking, throw themselves down in order to open fire again at the shorter range thus gained. As a rule, the leading echelons open fire at once from their new positions, so as to facilitate the advance of the others, unless special circumstances make it advisable to delay the firing until all the other units have reached a good position and are able to direct an effective fire upon the enemy.

At short ranges, in covered terrain, or on ground swept by hostile fire, the best way to avoid losses is to advance in small groups consisting of several skirmishers. During each rush, the adjoining flanks of neighboring units cease firing, so as not to injure the men of the advancing unit. Platoon and company commanders hurry ahead, while squad leaders see that all of the men move forward.

Standing crops frequently enable the echelons in rear to follow the firing line in closer order, and may even permit supports, which are to carry that line forward, to come up in that formation.

The **assault** is to be made either in close or extended order to the tune of the Royal March and with loud cheers.

The regulations assume, however, that the superiority of fire, gained by the mutual coöperation of infantry and artillery and by the participation of the reserves, will induce the opponent to retreat. When engaged with an obstinate opponent, who remains in his position, only a part of the leading line is to be launched against certain sections (*tratti*) of the defensive position, while other parts, by means of rapid fire, prevent the enemy from supporting the threatened sections. In conjunction with this frequently emphasized scheme of penetrating several specially important sections of the hostile position, the regulations express the view—by no means generally considered sound—that the capture of several judiciously chosen points will force the enemy to retreat.

The assault is, as a rule, to be made by order of the commander of the whole force. The short burst of rapid fire preceding the assault is suddenly terminated by the command "attention" (*attenti*), and at the command "to the assault" (*per l'assalto*), the men throw themselves with loud cheers, accompanied by the sounding of trumpets and the beating of drums, upon the enemy. When a unit has already gotten so close to the enemy that further waiting would be useless, it advances to the assault, after getting permission therefor, or, otherwise, on its own responsibility. All the rest of the troops are to join in this movement.

DEFENSE.

So long as it is not definitely known in which direction the enemy will approach, the position is to be occupied with as weak a force as possible. The decision is to be brought about by a **counter-attack.** Long range fire is only considered proper on broad stretches of open terrain devoid of cover; and, in general, fire is not to be opened until the enemy arrives at short ranges. As soon as fire is opened, all the supports are to be in the firing line. A counter-attack is undertaken by the first line only in exceptional cases.

THE FRENCH DRILL REGULATIONS OF 1904.

ATTACK.

Both the French and the German regulations show a decided preference for the offensive, and both have eliminated all rules which might produce normal formations. There is an unmistakable inclination towards shock tactics in the French regulations, although the term "shock troops" has been replaced by "maneuvering troops". "The forward movement alone is decisive and irresistible. . . . The fire is the element that executes". The habit of looking upon the German army as a probable opponent leads the French to provide for reconnaissance with mixed detachments. The regulations do not touch upon the tactics of the rencontre, and prescribe a more cautious conduct for the advance guard than the

German regulations.* The advance guard is to occupy supporting points, under cover of which the main body can deploy, and to complete the reconnaissance by its fight. The necessity of infantry detachments completing the reconnaissance made by the cavalry is particularly emphasized.

Another difference between the two regulations considered lies in the manner of making use of the cover afforded by the ground. The danger of going too far in this direction is guarded against in the German regulations by assigning combat sections to the various units. The French regulations prescribe a group formation of the several combat elements, and a concentration at favorable points, while the plain devoid of cover is left unoccupied. The center of gravity of a French attack does not lie in the firing line—the fight for the superiority of fire is not mentioned—but in maneuvering troops cautiously led after the firing line. The defender is to be engaged all along the line and, when the weak points of his position are recognized, the commander-in-chief is to give the order for the assault.

This division of a force into a fire and a shock group causes the French to prefer the echelon formation on general principles. A brigade is formed as follows, for example: Two battalions of the 1st regiment in the first line, which is followed at 400 m. by the third battalion (*troupe d'entrainement*); the 2nd regiment follows at a like distance as a reserve.

The regulations divide the attack into the artillery and the infantry preparation (*préparation*), the decisive action (*l'action décisive*), and the completion (*l'achèvement*).

The artillery in the preparatory action. The artillery is to endeavor to silence the hostile artillery as quickly as possible, without, however, expending more ammunition than is absolutely necessary. . . . The commander is not to give the order for the attack until the preparation is considered sufficient.

The troops are led forward over the terrain in a particularly careful manner (see p. 208 supra), and are then concentrated in a sheltered and protected place. Twelve mounted men (Reservists) are attached to every infantry regiment for reconnaissance purposes. The manner in which the French utilize the ground is typical. In this, widely separated parts of the force may unexpectedly encounter a strong hostile firing line, and may be defeated in detail.

The official regulations are supplemented by special regulations issued in March 1907 for the army maneuvers by General Lacroix, formerly commanding the VIIth Army Corps, and at present Vice President of the Supreme War Council.

Assembly. The division is assembled in division square (*carré de division*), in which the brigades are in line or in echelon, the regiments in line of double columns or in line of company columns, abreast or in echelon. If a frontal attack is to be made, in which successive lines are pushed forward without any attempt to envelop (in other words a pure

*See pars. 354, 356, 357 and 366 German I. D. R.

frontal attack), the division is concentrated with the brigades abreast, their regiments in echelon. If a flank attack is to be made, in which the leading brigade must be protected by an echelon and a reserve ready for any eventuality, the division is concentrated with the brigades in echelon, their regiments abreast. The artillery is posted in section column near a road in rear of the *carré*. The pioneer company is divided into four parts, corresponding to the four heads of columns of the assembled troops, for the purpose of removing obstacles and cutting passages during the forward movement. The cavalry is pushed forward and the assembled force is protected in all directions by outposts of infantry and cavalry.

Preparations for the advance in mass formation. During the concentration, mounted officers reconnoiter the covering features of the terrain which are to be utilized during the advance of the massed division, and later these officers act as guides.

Preparatory attack formation.

A. Pure frontal attack. The leading regiment in each brigade is to have two battalions in the firing line and supports, the third to be echeloned in the rear of the outer flank. All of the battalions are to be protected by infantry patrols and by a small detachment of cavalry. The second regiment is to have one battalion echeloned in rear of the inner flank of the leading regiment, and the divisional cavalry is to be held in rear of the division, in readiness to advance to the right or the left.

B. Flank attack. The two regiments of the leading brigade are to furnish their own firing lines, supports, and reserves. The third regiment is to be echeloned 500 m. in rear of the others, and the fourth regiment is to form the general reserve. The cavalry is to reconnoiter on the outer flank. In this case, as well as in a pure frontal attack, the artillery is to take up a position from which it can support the attack. Drummers, trumpeters, and bands, are to march with the general reserve. The regulations state that it is absolutely essential for infantry units to be sheltered from hostile observation during their forward movement, and that they must remain under control of their leaders up to the last moment. Troops are not to deploy until they enter terrain swept by the enemy's fire. (According to the decision of umpires at peace maneuvers, this would be at 5000 m.). It should be borne in mind that deployed troops cannot move by a flank, but only straight to the front.

The forward movement, in which the terrain will invariably cause lateral displacements of troops, is made from cover to cover, when necessary, from one supporting point to another. No hard and fast rules or normal formations are prescribed for this advance.

The advance is to be made as long as possible without firing a shot. When this is no longer practicable, recourse is to be had to fire, as the only means of making a further advance possible.

Kinds of fire. Fire at will (*feu à volonté*), principally used at short ranges, for the purpose of retarding the enemy's advance; fire with counted cartridges (*feu à cartouches comptées*), the number being given

(this is the fire usually employed); magazine fire (*feu à répétition*); and the fire of specially designated marksmen. Volley fire has been again prescribed. "Bursts of fire" (*rafales*) are typical of French fire tactics. (See p. 164 supra).

After fire has been opened, the advance is to be made by rushes, but the regulations do not prescribe how these shall be made.

The regulations contain a very realistic description of the infantry combat with its fluctuations, isolated attacks, and reverses. They emphasize that all must be animated by a desire to carry forward, by means of reinforcements, any troops that may have been checked. At the point where an advance is absolutely impossible, as many hostile troops as possible are to be held fast by an energetic fire fight, while the troops in the decisive attack engage the enemy and advance impetuously.

A series of attacks is to be made from the various covering features all along the line. These, made with the impetuosity inculcated by the regulations, are very apt to fail prematurely. This is particularly likely to happen because some of the troops will fall behind, while others are able to push ahead more rapidly. These attacks are to destroy the power of resistance of the enemy and to exhaust him physically. The leading units are to cover with their fire the advance of those who are less favored by the terrain.* During peace maneuvers, the fight now comes to a standstill at a range of 600 to 800 m.

The supports (*renforts*) follow in a similar manner, ready to move up into the firing line at the first signal to that effect, or independently in case the situation requires it. Their entry into action is in a general way determined by the commander of the whole force. They are to augment the fire power of the firing line or to carry it forward. The efforts of all are to be directed toward constantly keeping up the advance.

At some points, the troops, when reinforced by their supports, will be able to attack some of the enemy's supporting points, and to effect a lodgment on the ground captured. At other points the attacking group will be too weak to push the attack home. In such a case, the troops are to effect a lodgment on the terrain (*s'accrochent sur le sol*) in rear of the nearest cover, as close as possible to the enemy's position, and are to maintain themselves there until artillery or neighboring troops can support them. The fire of these troops is to give the enemy the impression that an attack is to be made here also. "No matter how successful these usually protracted fights may be, troops must be launched in a decisive attack at some points. The infantry should endeavor to compensate for its numerical inferiority by skillfully utilizing the ground and intrenchments, by great activity, and, above all else, by invincible pertinacity. The supporting point will thus become the center of the fight of a separate combat group."

*According to DENCAUSSE, in *Journal des Sciences Militaires*, 1906, and November-December number 1907, the infantry should endeavor to approach within 700—800 m. of the enemy's position without firing a shot.

The commander should endeavor to maintain cohesion, and to equalize fluctuations in the combat by controlling the activity of the artillery and by putting in fresh troops. During this group combat, the commander must decide where the retained troops should be launched for the assault. The selection of a point of attack is essentially the personal task of the commander and is an index of character and of eye for the value of ground, neither of which can be regulated by fixed rules. The regulations do not believe that close order formations can be dispensed with in launching the assaulting troops. Troops in close order, utilizing the ground to the best advantage, so as to suffer but slight losses from hostile fire, are to be brought up to the fighting line in a flexible echelon formation in order to give to that line, as *troupes d'assaut*, the impetus for the assault.

According to Thomas de Colligny,* formerly general staff officer of the 9th Infantry Division, a battalion designated to make an assault should form in four lines, each consisting of one company; the distance between lines being 150 m., and the front covered likewise 150 m. Each of the three leading lines should be formed in line of platoons in columns of route at deploying intervals sufficient to allow single rank line to be formed, and the fourth line in a similar formation with 10-pace intervals between platoons. When one of the lines is checked, the next succeeding one is to carry it forward. If the French believe such close order formations to be indispensable, they will be compelled to make a more extensive use of cover.

Colonel Dencausse is the exponent of a suggestion made by General Bonnal. The latter forms a division for attack as follows: One regiment, on a front of 600 m., as the advanced line (*avant ligne*), in rear of that, the assaulting troops (*troupes d'assaut*). First line: one regiment, its twelve company columns abreast; second line: one regiment, its three battalions in double column at extended intervals, 300 m. in rear of the first line; third line: the fourth regiment, its battalions in route column abreast of each other, 300 m. in rear of the second line. While, during our peace maneuvers, we continue to fire on the enemy's firing line in the expectation that his supports and reserve will in the end enter our zone of fire, it might be advisable, when confronted by a French opponent, to direct our fire on his reserves as soon as these become visible.

Envelopment. This is occasionally mentioned in the regulations (for example in pars. 290, 301 and 302). However, the Field Service Regulations, in discussing the attack, whose phases may vary in length depending upon the intentions of the commander, state that the attacker "may assail a wing or a flank of the enemy with superior forces for the purpose of annihilating him."

For the **use of the spade in attack**, see p. 392 supra.

*Conseils à mon bataillon, p. 107.

DEFENSE.

The French defense is characterized by group fortifications, advanced positions, and advanced posts* (intended to prevent hostile reconnaissance), and numerous counter-attacks.

For defense, a force is divided into the firing line with its supports, and the maneuvering troops (general reserve) intended for offensive action. In addition to calling attention to the necessity of overwhelming with fire the hostile troops advancing over open ground, the regulations recommend that the fire be withheld occasionally and that the enemy be allowed to run into the greatly accelerated fire which is unexpectedly directed upon him. The fire is to be discontinued as soon as the enemy takes to cover, and is to be increased to the utmost intensity when he moves in dense formation over open ground. The supports are to be used to augment the fire power of the firing line.

Counter-attack. General Lacroix states: "The frontal attack is met by the offensive return (*retour offensif*), the flank attack by the counter-attack. In order to prepare for this, the commander should ride ahead to examine the ground, and to consider what counter-measures he should take. The artillery can render the most effective assistance by registering its fire upon the points at which the enemy will probably advance, and by preventing him from leaving his position. If the attack is successful, the local reserve advances beyond the firing line, which has entered the hostile position, and fires upon the retreating enemy. The general reserve now becomes the local reserve, and the former firing line re-forms and becomes the general reserve."

The regulations make a distinction between counter-attack (*contre attaque*) and offensive return (*retour offensif*). A **counter-attack** is made by the reserve before the enemy penetrates into the energetically defended supporting points. In contrast herewith, every attempt to retake a captured position is called an **offensive return.** (For details see p. 439 supra).

Occasionally, it may be advantageous not to await the crisis, but to force the assailant to deploy by directing a heavy fire upon him, then to break off the action, inducing the enemy to press on, in order to draw him, by this means, onto previously selected and reconnoitered terrain,

*These frequently consist of detachments of all arms (*détachments de couverture ou de contact*). General BONNAL (*Deutsche Revue,* December number, 1907) says: "The French regulations—in contrast to the German—provide in defense for detachments of all arms, which are pushed forward for the purpose of compelling the enemy to show his dispositions, and to draw him on in a direction favorable for the defender. Both systems have their advantages and disadvantages, and we, for our part, are of the opinion that in sending out advanced detachments one must exercise great care in order that these may not be defeated in detail, for this is invariably detrimental to the whole force."

where he is suddenly attacked in flank by fresh troops. Military history shows that this very procedure has frequently been successful.

"The same activity, the same determination to maneuver, must prevail everywhere. Every mistake and every weakness of the enemy must be quickly perceived and promptly utilized. The troops in the counter-attack should move forward without hesitation and regardless of the cost. When such a forward movement has to be discontinued, the commander must decide where it shall cease. The efforts of all should be directed toward one object, that of tiring and demoralizing the enemy by constant counter-attacks, until the moment arrives when the commander must order the offensive to be assumed."

THE BRITISH DRILL REGULATIONS OF 1905.*

ATTACK.

The regulations do not mention the rencontre. A normal offensive battle consists of "an advance from point to point. Every lodgment made in a new firing position weakens the enemy's strength in his main position, and paves the way for a further advance; every advance must be thoroughly prepared and systematically carried out."

In the following, the attack made by a brigade of four battalions is used as a basis. While the commander reconnoiters under the protection of his advance guard, the troops are concentrated in a "preparatory formation", the battalions in one or more lines of "quarter columns" (column of companies). As soon as the commander has decided which flank of the enemy he will envelop, against which portion of the enemy's line he will launch his decisive attack, he assembles his subordinate commanders to receive the orders. According to the regulations, it will rarely be possible to issue orders while the troops are still in march. The orders are, as a general rule, to be given in writing, and are to be supplemented by verbal instructions, in which the commander calls attention to the peculiarities of the terrain, especially where a hostile counter-attack is possible. In exceptional cases, the brigade commander designates the position to be taken up by the machine guns, and gives directions to them in regard to supporting the advance by long range fire. A base battalion is to be designated. When the enemy's position is visible, a point of attack is assigned to every unit. When this is not practicable, the base battalion is led forward by officers familiar with the ground, or it is given a compass direction. Every leader is to provide independently for reconnaissance and for communication by signal flags and also by telephone; a mounted signal corps man accompanies the brigade commander.

Every unit is formed in three lines for attack.

**Infantry Training. Combined Training.—Vierteljahrshefte,* 1906, III, *The Development of the Tactical Views in the British Army after the Boer War.*

The **first line,** consisting of scouts and skirmishers with supports, is made as weak as possible; without supports rarely more than one-fourth of the whole force.

The **second line,** the reserves of the firing line, is under the orders of the appropriate battalion commanders, and is to reinforce the firing line, protect the flanks, and deliver long range fire. The second line is to fill up the firing line to the maximum density, *i. e.*, to one man per yard of front (0.9 m.).

The **third line,** the general reserve, is to assure the success of the attack. It is to be made as strong as possible, seldom less than one-fourth of the whole force.* "The general reserve is directly under the orders of the commander of the whole force. It enables him to meet the varying contingencies of an engagement or to ward off counter-attacks. If the attack succeeds, the general reserve pushes forward rapidly to take up the pursuit; if the attack fails, it serves as a rallying force, but before the commander decides to leave behind even a part of it, he should consider whether, by launching all the troops at his disposal, he could break down the resistance of the defender. The commander can only exercise an influence on the course of the action by means of a reserve. If he keeps in his own hands a strong reserve, he will have it in his power to take advantage of any mistake the enemy may commit, to restore the battle should the leading troops meet with a serious check, to meet a counter-attack in force, or, in case of need, to provide the additional strength required to drive the attack home."

In contrast with these provisions, we find, strangely enough, under the heading "Brigade", the hint that, when advancing to the assault, it is advisable to keep back a portion of the reserve in a rallying position. Even a battalion commander is invariably to retain at least half a company at his disposal. The British were not without reason censured because their flank attacks were ineffective in South Africa on account of the lack of energy of the frontal groups, and their new regulations accordingly contain detailed rules for the conduct of the "holding attack". The troops holding the enemy in front are to threaten him for the time being. This is to be accomplished by wide extension, and by deceiving the enemy by occasional bursts of fire (*rafales*), by employing machine guns, by retaining supports far in rear, and by refraining, for the time being, from advancing to decisive ranges. But the troops are to be ready to join in the main attack when the latter advances. The regulations state that, in order to deceive the enemy effectually, adequate forces will have to be launched and that the commander will have to act vigorously. (See p. 447 supra).

Fixed rules for the front to be covered by a unit in action are no longer given. A unit fighting alone may cover considerably more front than when acting as part of a larger force. In a decisive attack, a battalion in the first line may put 125 rifles on every 100 yards (90 m.) of front; these are distributed between firing line, supports, and battalion reserve; the

*According to the old regulations, a part of the general reserve had to remain in rear in rallying positions. (See p. 397 supra).

latter may consist of one or more companies. Entire companies are only deployed in exceptional cases, for example on open ground, where it is difficult to bring up the supports. The size of the reserve depends upon the losses to be anticipated in the firing line; when these will be small, in all probability, the reserve may be made as strong as the firing line plus supports. In attack, a battalion may accordingly deploy on a front not exceeding 800 yards (formerly 540 m. was prescribed). A brigade of four battalions may deploy on a front of 1400—2100 m., depending upon the number of battalions engaged.

When the force arrives within 4 or 5 km. of the enemy, the battalions are formed in two lines of companies. Each company in the first line is preceded by a platoon in close order, and this is in turn protected by scouts. As soon as these scouts can advance no farther, they lie down and await the arrival of the fighting line. The latter advances under cover of the supporting fire of infantry, machine guns, and artillery. Fire of position is considered necessary. Fire at will is from now on used. This is to vary in intensity according to the character of the target, and the range. It is to increase to special violence when the attacking infantry advances over level ground or encounters obstacles. The fire is to be discontinued when the advancing skirmishers reach cover. The firing line is to advance as close to the enemy as it can without suffering excessive losses. Fire is to be opened when the hostile fire makes this necessary, but small losses are to be borne.

After the fire fight is once begun, it is to be conducted with more rifles than the enemy has in action. "Battles are only won by controlled fire directed upon targets at decisive ranges" (according to the regulations, at ranges under 540 m.). Within the zone of effective fire, all the troops are to deploy. In consequence of this, skirmishers, who endeavor to work forward independently, are scattered all over the terrain over which the attack is being made. At the initial deployment, the interval between skirmishers is to be about 5—15 paces; at short ranges, at points where the decision is sought, there is to be at least one rifle for every two or three yards of front (1.80—2.70 m.=2½—3½ paces). Another paragraph of the regulations prescribes that the maximum density is to be one rifle per yard of front. The British views, when compared to those entertained by them immediately after the South African war, have undergone a noticeable change, especially as regards the frontage of a firing line; dense firing lines, possessing strong fire power, are at present deemed essential to a decisive fight, while the fire of widely extended lines is considered ineffective. The intervals may vary considerably, but the regulations state that it should be borne in mind that the difficulties of conducting a fight are increased and the fire power reduced when too great a front is covered; moreover, that in covered terrain, and when counter-attacks may be anticipated, an overextension is actually dangerous. Because of the necessity of moving in thin skirmish lines, it is considered essential that the men be trained to act independently, to continue the fight even in a difficult situa-

tion, and to do everything in their power to carry out the original intentions of the commander.

Rushes over open ground are not to exceed 80—100 yards (72—92 m.) in length; as a rule they are to be shorter. According to an example given in the Firing Regulations, rushes are to be 25 yards (22 m.) long, at ranges from 650—500 yards (580—450 m.). A rush is to be continued while the enemy's surprise lasts and he finds no opportunity to deliver aimed fire. In covered terrain, the rushes are to be made from one covering feature to another.

"On open ground and within effective range, long lines of skirmishers, rising simultaneously, will suffer heavy losses even when making short rushes; the sudden movement of smaller units may take the enemy unawares, so that for a time at least well aimed fire is avoided. The rush is continued only while the surprise of the enemy lasts. The shorter the range, the smaller the advancing unit will have to be, and the shorter the length of the rushes."

The dispositions for a rush are to be made as unostentatiously as possible. The rearward detachments, which follow by rushes, are to advance, if possible, beyond the group already firing. When squads are unable to advance by rushes, the men may crawl forward singly.

The regulations state that, when in close order, units of the strength of company columns (80—100 men, 4 platoons, in column of platoons at full distances), having a front of 10—12 files, suffer comparatively small losses when exposed to long range fire (1800—1200 m.). The troops are to deploy before reaching effective ranges (1200—600 m.), as they will otherwise suffer serious losses. At decisive ranges the firing line is to be filled up to its maximum density.

The whole force, a small part excepted, is to be launched in the **assault;** a sudden and unexpected advance of the assaulting troops is considered particularly important. The order for the assault is to be given by the commander of the whole force, but the manner of conducting it is left to company commanders.

When the attack would be too costly by day, however, the troops are to intrench, wait until it is dark, and then advance to assaulting distance, where they again intrench (machine guns, and even single field guns are to be taken along). The assault is to be made, after a brief but violent fire fight, at the first streak of dawn.

DEFENSE.

In defense, a force is divided into the fighting line with supports, and the reserve. The latter furnishes the outposts and the garrisons for the advanced positions (so-called temporary positions). The object of **advanced positions** is to mislead, deceive, and check the enemy. They are to be evacuated before the troops in them become seriously engaged. It is not considered necessary for the **main position** to consist of a con-

tinuous line of trenches; every platoon and even every squad may have its own trench. The principal requirements are good field of fire and mutual support by oblique or enfilade fire.

The strength of the garrison is to be governed by the size of the field of fire and the character of the works. The regulations state that, under favorable conditions, a few men can defend a broad front, but that, when the attack is favored by the terrain, a strong garrison is required. Firing trenches, unless they are to serve as dummy intrenchments, are not to be constructed so as to stand out against the horizon. The importance of masking firing trenches, and of constructing overhead cover is emphasized; special cover trenches for the supports may be constructed in rear of the crest.

Against skirmishers, fire is to be opened at 1000 m., but it is also considered desirable to withhold the fire until they get within short range. It is believed that this will be attended by success when the assailant is ignorant of the position of the defender or makes his attack with poorly disciplined troops. Continuous long range firing tires the eye and the hand. The decision is to be brought about by a **counter-attack** made by the general reserve. Local counter-attacks by section reserves are also recommended. The tendency of the British to make the section reserves very strong has been frequently observed. The final stage of the combat consists, as in Wellington's day, of a counter-attack all along the line. As soon as the opponent has arrived within assaulting distance, the troops holding the position are to fix bayonets and, after delivering magazine fire, are to make a short frontal counter-attack.

THE JAPANESE DRILL REGULATIONS OF 1907.

ATTACK.

The Japanese views coincide almost exactly with the German, but take their peculiar theater of war into consideration.

Kinds of fire. Fire at will, volley fire, and rapid fire are used.

Rushes are not to exceed 100 m. in length, as a rule, but the regulations admonish leaders to "guard against the mistake of making rushes that are too short. When rushes are shorter than 30—40 m., their value will be insignificant, as a rule." Leaders are likewise to avoid sending forward units smaller than a platoon, in order that the advance may not be too much retarded and the difficulties of leading increased.

The regulations particularly emphasize that it will rarely be possible "to shoot an enemy out of his position", and that, on this account, the decision will, as a rule, be brought about by the assault with cold steel. They further state that, when the enemy can be kept down by artillery fire, the advance of the infantry will be easy; that, as it is

difficult to obtain a timely effect from artillery fire directed upon an enemy who takes advantage of cover or who occupies a fortified position, the infantry cannot wait for the successful termination of the artillery combat, but, on the contrary, should advance while that combat is in progress, for only by so doing can it count upon the effective coöperation of its artillery. But, nevertheless, infantry is to make the attack independently, even if it has to dispense entirely with the coöperation of the artillery.

The regulations consider the rencontre and the attack on a position prepared for defense.

Rencontre. The regulations prescribe that in a rencontre the advance guard should make a vigorous but, at the same time, deliberate attack; that the commander should promptly decide what to do, even if the situation is not entirely clear; and that, when practicable, the main body should be launched as an entity. A fight against a superior enemy is only to be avoided, for the time being, in case the latter has gained a start in deployment.

Attack on a position prepared for defense. The commander frames his plan of attack according to the results of the reconnaissance, and leads his troops forward provisionally into a preparatory position, where he assigns deployment spaces and, if practicable, combat sections to the different units. In order that they may utilize the covering features of the ground to the best advantage, the different units are to avoid advancing abreast. On account of the difficulties attending an advance over ground swept by hostile fire, it is considered desirable for the troops to take advantage of the cover afforded by darkness. In order that, in such a case, serious lateral displacements of the troops may be avoided, the fighting line is to be sent forward the day before to endeavor to drive back the troops posted in front of the enemy's main position. The regulations state that, when an attack is contemplated to be made during daylight against a strong position prepared for defense, there is no alternative but to approach the assaulting position by intrenching successive attack positions, but that, when circumstances permit, an attempt must be made to advance under cover of darkness to the enemy's position. In the latter case, the assaulting position is to be designated during the day, after a thorough reconnaissance, and detailed preparations are to be made for the advance. As soon as the troops arrive during the night in the selected position, they are to construct cover quickly, and to intrench. When the ground is so hard that intrenching tools cannot be used without difficulty, recourse is to be had to the sand bags that are carried along. The men engaged in digging trenches are at all times to be ready for action.

The regulations state that whether a force which has occupied an assaulting position should make the **assault** immediately at dawn or should first prepare it by fire, will depend on circumstances; and that, if attempted at dawn, the success of the assault will depend on the sud-

denness and rapidity with which it is carried out. The reconnaissance of the position and the work of removing obstacles is to be completed, if possible, during the night, so that avenues of approach will be open for the assaulting troops.

If the reconnaissance has gained all the necessary information, and if the preparations are completed, the assault may be made before the night is over. The regulations say that, when an assault is made at night, the distance to be covered should be very short; and that it will depend on circumstances whether the assault is made suddenly, directly from the last firing position, or whether it is carried out upon the completion of works of approach. When necessary the assaulting bodies are to carry along hand grenades and demolition tools, the latter being selected in conformity with the results of the reconnaissance.

The regulations state that to have captured a position does not suffice; that only the pursuit and dispersion of the enemy makes the victory complete. The troops that have penetrated into the hostile position are to continue the advance until they again find a field of fire, whereupon they are to fire upon the retreating enemy. The troops which do not take part in this fire are to re-form quickly, secure the captured position, take requisite measures for security, and make preparations to meet any hostile counter-attack. Troops are not to be assembled in large bodies at points exposed to hostile artillery fire. As soon as the enemy has gotten out of range, all the troops are promptly to resume the forward movement, and are to pursue him vigorously so far as due regard for cohesion and order permits.

Intrenching tools are to be used in attacks on fortified positions, and in strengthening ground captured from the enemy.

DEFENSE.

In defense, the Japanese regulations, like the German, provide for economical occupation of the front (group fortifications) and a general reserve, which is to be used offensively or to protect the flanks. Dummy intrenchments, patrols, and outposts are to make it difficult for the enemy to gain information of the defensive position. The Japanese views in regard to **advanced positions** are not so pronounced as the German, for, while their regulations mention the combat of the outposts pushed forward from the position, the danger of advanced positions is not especially emphasized.

The training of the soldier is to be such that even after he has fired away all of his ammunition, he will still defend his position with the bayonet.

Nothing is said in regard to the distance of the infantry position from that of the artillery. If information is received that the attacker has made a lodgment during the night in the assaulting position, small detachments are to advance and prevent him from strengthening his position.

THE RUSSIAN DRILL REGULATIONS OF 1907.

The present regulations only treat of the formal matters of training and combat.

THE SWISS DRILL REGULATIONS OF 1908.

ATTACK.

There is considerable similarity between the Swiss and the German regulations. The keynote is the offensive. The purpose of the combat and the condition of the troops are to govern the commander in deciding whether to stand on the defensive or to attack. The regulations state that decisive results are only offered by the attack; that considerations of a presumable hostile superiority and other apparently unfavorable conditions should not diminish the energy of the attack; and that the decision to launch the troops should never be made dependent upon the receipt of reports in regard to the enemy.

The offensive is invariably to be assumed, unless the situation or the mission compel the force to stand on the defensive. The regulations state that, in attack, success does not rest alone upon superiority of fire and superiority of numbers; but that an impetuous advance and an unswerving determination to win are of just as much importance. The conduct of the Swiss attack varies, depending upon whether it is made in a rencontre or on a position prepared for defense.

The views entertained in regard to the **rencontre** coincide with the German views. The regulations say that the result of the reconnaissance should not be awaited, because success depends largely upon prompt action. The commander may launch parts of his main body in succession, as soon as they arrive, when the force is operating in close country, when it is necessary to gain ground quickly on debouching from a defile, or when the enemy makes an impetuous advance. The commander is to direct all his efforts toward throwing the enemy upon the defensive, and then to launch the main body as an entity.

The Swiss regulations, similar to those of the Japanese, only discuss the **attack on a fortified position;** various modifications of the attack, depending upon the preparations made by the enemy, are authorized. Advantage is to be taken of the cover afforded by darkness, and an extensive use is to be made of **intrenching tools.** The regulations state that an assault by day only has a chance of succeeding when the defender is completely subdued, and when only insignificant obstacles and defenses are encountered. When this is not the case, the day is to be used for making preparations for the attack, and the night for executing it.

DEFENSE.

The regulations consider the involuntary defense in a rencontre; the deliberately prepared defense seeking a decision and contemplating an assumption of the offensive; the defense for the purpose of gaining time; and the occupation of a position in readiness, when the direction in which the hostile attack will be made is still in doubt, or when the commander intends to assail the enemy while the latter is in the act of deploying. In the **defense seeking a decision,** advanced positions are not to be used, because it is believed that the employment of detachments of troops in front of the defensive position will weaken the latter, and a hostile enveloping attack will soon force the advanced troops to fall back upon the main position. The regulations point out that if the advanced troops are supported by fire from the main position, the latter will be prematurely disclosed to the assailant. The employment of advanced troops is, however, considered justifiable to hold defiles, to deceive the enemy, or to support the cavalry.

The works of a position are not to be continuous, but are to be constructed in groups. Infantry positions over which artillery is to fire are not to be less than 500 m. in front of the latter.

XV. THE EXPENDITURE AND SUPPLY OF AMMUNITION.*

1. HISTORICAL SKETCH.

The question of ammunition supply in action is of vital importance to the infantry. To solve it correctly means to assure the success of the infantry in fire action. The first question that needs consideration is, whether the experiences of past wars show that the ammunition at present carried by the infantry is sufficient, under all cimcumstances, even when ammunition columns cannot reach the battlefield in time because all the roads are choked with troops.

For our purpose, it is sufficient to go back as far as the **Franco-German war,** in which breechloaders were used for the first time against breechloaders. Every German soldier carried 80 cartridges, and the 6-horse battalion ammunition wagons carried 20 additional rounds per man.†

When one considers the total number of cartridges expended during any campaign, it seems impossible that a shortage of ammunition could ever have taken place. In the **Franco-German war,** the expenditure of ammunition in the Ist Bavarian Army Corps amounted to 4,163,000 rounds (166 per rifle); in the IInd Army Corps, 1,105,600 rounds (44 per rifle); and in the Saxon Army Corps, 1,450,000 rounds (about 58 per rifle). The compilation of a table, showing the amount of ammunition expended in the Prussian army, was begun, but was soon discontinued, as it was found that the necessary data were lacking, the only information available being the record of the number of rounds issued by the reserve ammunition parks. The troops sent to the field army from the depot battalions, must have brought with them in each case a very considerable amount of ammunition, as each man carried 80 rounds, but no records are available to show how much ammunition was forwarded in this way. Furthermore, there is no record of the number of rounds

*Lieutenant-Colonel KOVARIK, *Versuch eines kriegsbrauchbaren Systems für den Munitionsersatz im Infanteriekampf,* Berlin, 1903.

†Historical data given by D. GÜNTHER in *Die Entwickelung der Feuertaktik der Infanterie,* 1902.

actually expended and of the amount of ammunition lost or left on the dead and wounded. It is well known, that in the long periods, during which no engagement had taken place, an enormous amount of ammunition was lost on marches and in bivouacs. This applies likewise to battlefields. The commander of an ammunition column had his men pick up 22,000 rounds of needle gun ammunition in unbroken packages on the battlefield of **Hühnerwasser.**

A shortage of ammunition first manifested itself where the troops, on removing their knapsacks, had neglected to take out the tin boxes filled with ammunition (for example in the 12th Jäger-Battalion at **Sedan**),* or where the ammunition wagons had been sent to the rear with the field train (for example in the 50th Infantry, on January 19th, 1871, in the battle at **Mont Valérien,** and in the 38th Brigade, at the battle of **Beaune la Rolande**).†

The regimental histories contain only a few statements in regard to the amount of ammunition expended in the various engagements. Moreover, these statements are only approximations and, as a rule, cannot lay claim to trustworthiness.

The amount of ammunition expended in the opening battles of the war was very small, due to the training and fighting methods of the Prussian infantry, and to the support it received from the artillery. Moreover, the short range of the rifle prohibited long range firing.

"In order to hold its own against the intensity and long range of the hostile fire, the German infantry was compelled to fire more rapidly and at longer ranges than it had intended. In addition, the difficulties of fire control and fire direction were frequently increased on account of the tremendous loss of leaders. Under these circumstances, so much ammunition was expended that, among the troops fighting in the first line, the ammunition carried by the men was no more than enough. This explains why it not infrequently happened that the fighting efficiency of the infantry was impaired by a lack of ammunition. The first general shortage of ammunition occurred at the battle of **Mars-la-Tour** in the infantry of the IIIrd Army Corps."‡

On August 16th, at the battle of **Vionville,** the Prussian IIIrd Army Corps, whose effective strength was 21,050 rifles, expended 720,486 cartridges, which corresponds to only 34.5 rounds per rifle; yet, in spite of this, the ammunition ran short. During the lull in the battle at noon, by removing the cartridges from the dead and wounded, each man in the 35th Infantry¶ was again supplied with about 200 rounds of ammunition, which were then expended in the course of the afternoon, so that toward evening another shortage occurred.

**Gen. St. W.*, II, p. 1175.

†HÖNIG, *Volkskrieg*, II, p. 259.

‡*Gen. St. W.*, V, p. 1460.

¶*Geschichte des Regiments Nr. 35*, p. 82.

The following figures in regard to the expenditure of ammunition during the battle of **Vionville** are taken from *Kriegsgeschichtliche Beispiele,* 8 and 9, by Major KUNZ:

IInd Bn. Leib Regt.....	12,749	rounds	for	850	rifles,	or	15	per rifle.
Ist Bn. 40th Inf.....	35,000	"	"	450	"	"	78	" "
IInd Bn. 40th Inf.....	6,650	"	"	350	"	"	19	" "
IIIrd Bn. 40th Inf.....	4,520	"	"	300	"	"	15	" "

A very annoying shortage of ammunition occurred in those parts of the Leib Regiment which were with the 72nd and 40th Infantry Regiments in front of the wood. The retained echelons in the wood had sufficient ammunition, but the troops in front lacked the means wherewith to inform the retained units of the shortage. In the 11th and 72nd Infantry Regiments a serious shortage of ammunition occurred after they had been engaged but a short time. (In a little less than two hours, the 72nd Infantry suffered the following percentage of losses: Ist Battalion, 53.2%; Füsilier Battalion, 48.2%).*

The defense of the stone wall at **Buzanval** by the 50th Infantry (German), on January 19th, 1871, was one of the most obstinate defensive fights of the war. The numerical superiority of the enemy at this point was overwhelming and his troops were excellent, nevertheless the regiment maintained the same splendid fire discipline it had already exhibited at Lundby. The fight lasted nine hours. In his history of the regiment (p. 350), Lieutenant-General v. Boguslawski says:

"The number of cartridges fired can no longer be accurately determined. Only the war diary of the IInd Battalion contains a note showing that 14,206 rounds were expended. As the 5th Company did not fire at all, and the 7th Company was only partially engaged, by far the greater portion of the ammunition must have been expended by the 6th and 8th Companies." The IInd Battalion, like the rest, has no record showing what ammunition was supplied to it during the battle. To cite an example: The 12th Company received about 3,000 rounds of ammunition during the fight. As the strength of this company was 180 men in round numbers, each man received 17 additional cartridges. He therefore had 97 rounds available, including the ammunition originally supplied him.

"Now, as each man still had an average of 5 cartridges on going into billets, he must have expended 92 rounds. From this we may assume that during the nine hours' fight, he fired a little more than ten rounds per hour."

In the battle of **Beaune la Rolande,** some of the companies of the 56th Infantry near Romainville had expended all their ammunition. In the 38th Brigade, only the Ist Battalion, 57th Infantry, was able to replen-

*For data in regard to the expenditure of ammunition at Beaumont, see HOFFGARTEN-HEIDLER, *Beaumont,* p. 184.

ish its ammunition directly from the ammunition wagons near Romainville. The defenders of Beaune did not receive such assistance however, as only one ammunition wagon was brought up (by the Füsilier-Battalion, 16th Infantry), toward the close of the battle, for the units engaged there. The ammunition it contained was distributed among the men, but was not used. Organizations belonging to the IIIrd Army Corps turned over some of their ammunition, but, in general, the brigade had to rely practically on the ammunition carried by the men, for all the ammunition wagons had driven off at the beginning of the battle. Consequently, this battle was fought almost exclusively with the ammunition carried by the men—about 80 rounds per rifle. As the French attack was not simultaneously directed against the whole front of Beaune, lulls occurred in the fight, which enabled the officers to send a supply of ammunition to the most seriously threatened points of the line. In a well disciplined organization, it is not difficult to send ammunition promptly to the most seriously threatened points by simply passing it along the line. This was actually done at Beaune la Rolande. In consequence of this redistribution, at some points in the cemetery, men fired as many as 200 rounds each, but others fired only 40 or less; the result, however, was the same, for the ammunition was almost exclusively supplied from that carried by the men —80 rounds per rifle. Moreover, a great many cartridges, and even unopened packages of ammunition, were found, on November 29th, in the position occupied by the 38th Brigade.

The following figures give an idea of the amount of ammunition expended at **St. Privat** by the 2nd Regiment of the Guard. On August 19th, the Ist Battalion required 27,340, the IInd Battalion 17,820, and the Füsilier-Battalion 7,870 rounds to replenish their ammunition supply. When the heavy losses suffered by this regiment are taken into account, the average expenditure of ammunition cannot be considered excessive.*

At 10:30 P. M., on August 18th, the Rifle Battalion of the Guard managed to supply each one of its men with 20 rounds of ammunition, without drawing upon the contents of the ammunition wagons, which were left intact.†

The expenditure of ammunition on the French side was considerably greater in all the battles. At **Champigny,** every French infantry soldier carried 118 rounds of ammunition, which did not prove sufficient, however, to meet the demand. In the French Army of the Rhine, the average expenditure of ammunition from August 6th to 31st was 30 rounds, and in the fights of August 16th and 18th, 13 to 27 rounds per rifle. In individual cases, the expenditure of ammunition was far in excess of these figures. The men of Grenier's Division, against which the attack of the 38th Brigade was directed, claim that they fired as many as 150 rounds apiece, on August 16th. In the evening, at the close of the battle, the commanding general

*Geschichte des 2. Garde-Regiments zu Fuss, p. 250.

†Geschichte des Gardeschützen Bataillons, p. 121.

of the IVth Army Corps reported a shortage of ammunition.* Shortage of ammunition caused Marshal Bazaine to fall back to Metz on August 17th. Notwithstanding the proximity of the fortress of Metz, the French VIth Corps was unable to replenish its supply of ammunition before it was attacked by the Prussian Guard. Detailed information available in regard to the ammunition expended by the 25th Infantry (French)† shows that each man had only 30 instead of 90 cartridges. (This was the regiment attacked by the Franz and 3rd Guard Regiments, who lost 2,160 men—9% hits). The statement made in the history of the 2nd Guard Regiment (p. 233), that every French soldier had 300 rounds of ammunition available on August 18th, cannot be substantiated by French records.

The expenditure of ammunition in the **Russo-Turkish war of 1877-78,** amounted to 33 rounds per rifle and carbine on the Russian side. The following detailed statements in regard to the expenditure of ammunition are available. In the engagement at **Aiaslar,** on August 23rd, 1877, the Sofia Regiment expended 94 rounds, and at **Karahassankioi,** the 140th Infantry expended 155 rounds per man. On December 28th, 1877, the 13th Rifle Battalion expended 122 rounds per man. In this connection, it may be remarked that the Russian infantryman of that day carried 60 rounds of ammunition in his cartridge boxes. The ammunition carts carried 55 additional rounds per man, and the ammunition parks 62. If, as prescribed by the regulations at that time, only one ammunition wagon followed an organization into action, each infantryman had 78 rounds available, and each man of a rifle battalion 106 rounds.

In front of **Plevna,** on July 20th, 1877, the Russians expended in six hours all the ammunition carried by the men and by the ammunition carts. On July 30th, during the second assault on **Plevna,** they expended in four hours all the ammunition carried by the men.‡ In the engagement at **Lovtcha,** the 3rd Rifle Brigade only fired during the pursuit. The brigade commander explained afterwards that his ammunition had run short nevertheless. During the advance, the ammunition wagons did not follow in rear of the organizations to which they belonged, and no provision had been made for bringing up the necessary ammunition.¶

On September 1st, 1877, the regiments which made the fruitless attack on the **Omar Bey Tabia,** expended the following ammunition:

63rd	Infantry§	.....	55,296	rounds,	or	21	per rifle
119th	"	.....	99,744	"	"	43	" "
64th	"	.....	24,650	"	"	10	" "
115th	"	.....	45,360	"	"	24	" "

*HÖNIG, *Taktik der Zukunft*, p. 159.

†PAQUIÉ, *Le tir en terrain varié*, p. 39.

‡Details given in the German translation of the Russian *Gen. St. W.* (Vienna), III, pp. 330—331.

¶KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg*, I, p. 88.

§These two regiments were only engaged from 1 to 1½ hours.

In the Kasan Regiment (No. 64), which had expended less ammunition than any of the others on this day, the ammunition began to run short at the moment when the successful and decisive counter-attack of the Turks commenced. The same misfortune befell other organizations, after the fire fight had lasted but a comparatively short time, as apparently they had neglected to remove the cartridges from the dead and wounded.

During the assault on **Scheinovo,** on January 9th, 1878, each man of the 11th Rifle Battalion fired 120 rounds in four hours. This is an average of 2 rounds per man, per minute.

The Turks took more advantage of the rapidity of fire of their rifles than did the Russians.* It is said that at **Gorni Dubniac,** each man had 800—900 rounds of ammunition available, and it is a fact, that the force of 3,570 men garrisoning the group of works placed 3,533 Russians out of action, in a fight lasting 9½ hours, while the Turkish losses in killed and wounded only amounted to 1,280 men. During the attack, some Turks managed to fire more than 100 rounds apiece. Kuropatkin found 120 empty cartridge shells beside a dead Turkish soldier.† In the engagement at **Tashkessen** (31st December, 1877),‡ which lasted eight hours, the Prisrend Battalion expended 292, the Tuzla Battalion 275, and a Rifle Battalion 263 rounds per man (30 rounds per man, per hour).

There is very little information available in regard to the expenditure of ammunition during the **Russo-Japanese war.** The Russian infantryman carried 120 rounds of ammunition, the 8 one-horse ammunition carts carried 6,600 rounds per company, and the 2 two-horse ammunition wagons of the battalions 14,400 rounds each. Assuming the strength of a company as 200, this would give 210 rounds per man. In the engagement at **Hamatan (Yalu),** several Russian organizations ran entirely out of ammunition. A number of rifle companies (the 6th Company, 11th Infantry, and the 2nd, 3rd and 4th, 12th Infantry), were able to replenish their supply without difficulty from the ammunition wagons. The following is taken from a thoroughly reliable report published in the *Kölnische Zeitung* of September 24th, 1905:

During the battle of **Liao Yang,** which lasted six days, the 138th Infantry fired 99,460, and the 139th Infantry 96,040 rounds. On September 1st, the 137th Infantry expended 189,000 rounds, in other words, nearly twice as much in one day as either of the other regiments expended in six. This excessive expenditure of ammunition was due to the very severe attacks which this regiment had to withstand on that day. These attacks were repeated on the next day and the regiment expended 169,000 rounds of ammunition. From October 13th to 18th, at **Linshinpu,** the 139th Infantry

*Each Turkish battalion was followed into action by 30 pack mules carrying 60,000 rounds of ammunition, and each man carried from 100 to 120 rounds on his person.

†KUROPATKIN-KRAHMER, *Kritische Rückblicke auf den Russisch-Türkischen Krieg,* I, p. 170.

‡BAKER, *War in Bulgaria,* II, p. 160.

expended 351,800 rounds. During this engagement the Japanese succeeded in getting within 10 m. of the Russian lines. Thirty bodies were picked up at 15 paces, and 580 bodies from 100 to 150 paces from the Russian position. The 139th Infantry lost 54 men killed, and 6 officers and 250 men wounded. Major v. Tettau* states that during the battle of **Liao Yang** (30th August, 1904), the 36th Infantry expended 416,800 rounds of ammunition, and the 34th Infantry (two battalions), 250,000 rounds, or for 4,200 Russian rifles an average of not less than 160 rounds per rifle.

The Japanese infantryman carried 120 rounds, and each company had, in addition, one two-wheeled ammunition cart carrying 16,000 rounds of ammunition. When packs were removed, each man carried a bag in which were packed three days' rations, and from 200 to 250 cartridges. The Japanese infantry invariably followed the principle that each man should be supplied with as much ammunition as possible before going into action. In the engagement at **Kinchau** (26th November, 1904), the 1st Infantry Division expended 64, the 3rd 54, and the 4th 143 rounds per man of the original effective strength.†

Although, according to the examples cited, 100 to 150 rounds of ammunition per man will in general suffice in battle, cases may arise where troops could fire a greater number of rounds to good advantage. This must be taken into account when determining the number of rounds with which the infantryman should be supplied—on his person and in the ammunition wagons. Moreover, it must be remembered that the supply can be replenished without difficulty from the ammunition columns after a battle, so long as it is still possible to assign a separate road to each army corps. When this is no longer practicable, the ammunition columns will encounter almost insurmountable difficulties in supplying the infantry with ammunition.

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*Achtzehn Monate mit Russlands Heeren in der Mandschurei.

†Streffleur, Einzelschriften. I. p. 224.

AMMUNITION SUPPLY OF THE PRINCIPAL ARMIES OF THE WORLD.

Country	Year of construction.	Caliber. mm.	Weight of cartridge g.	System of loading.	Weight of clip. g.	Weight of clip filled. g.	Number of rounds carried by a man. No.	Weight kg.	Ammunition wagons.	Number of rounds carried by ammunition wagons. No.	No. per rifle.*	Reserve supply.	Supply available in a division.	Supply available in an army corps.
GERMANY	1905 S.	7.9	27.19	Mag. in rear of barrel, loaded with clip holding 5 cartridges.	7	126	150 N. C. O. 45 Trumpeter 90 Drummer 30	4.5	4 Company ammunition wagons.	14,400	77	Each of the 24 am. wagons of the 4 inf. am. columns of an army corps, carries 28.000 rounds or 144 per rifle.	150 77 227	150 77 144 361
AUSTRIA	1895	8.	28.35	Mag. in rear of barrel, loaded with frame holding 5 cartridges.	Frame 16.5	158.25	120 N. C. O. 40	4.31	4 Company ammunition wagons.	9,450	47.2	Each division has one div. am. park of 30 am. wagons, which carry 769.500 rounds or 57 per rifle. The corps am. park same strength as a div. park.	16 battalions of 800 rifles each. 120 47.2 57 224.	3 divisions 224 18 about 242
ITALY	1891 Carcan-Mannlicher.	6.5	22.	Mag. in rear of barrel, loaded with frame holding 6 cartridges.	12	138	162 Sergt. and Trumpeter 126 Inf. Pioneers 108	3.736	Infantry of the line, in field train - - 24 Alpini, on pack animals and on carts 244			In the 3rd section of the am. column, 40 rounds per rifle; In the Arty. park of the army corps, 45 rounds per rifle; In the Alpini am. column, 90 rounds per rifle.	Line: 162 24 40 226 Alpini: 162 244 90 496	Inf. of the line: 162 24 40 45 271
ENGLAND	1908 Lee-Enfield.	7.71	27.5	Mag. in rear of barrel, loaded with clip holding 5 cartridges.†	Clip 12.5	150	115	3.48	8 Pack animals 8 Ammunition wagons		250	In the division am. column, 125 rounds per rifle.	115 250 125 490	400 rounds per 1,000 rifles.
FRANCE	1886—98, 1905 D Lebel.	8.	29.	Mag. under barrel, cartridges loaded singly.	—	—	120 N. C. O. 56	3.48	4 Company ammunition wagons.	16,384 or 19,000‡	82	In the corps am. park: 1st echelon - - 44.2 IInd echelon - 66.2	120 82 202	110 312
RUSSIA ¶	1891 (Three line rifle).	7.62	25.812	Mag. in rear of barrel, loaded with clip holding 5 cartridges.	9.6	137	120	3.33	24 am. carts: 1st echelon, 8 1-horse carts IInd echelon, 16 2-horse carts	In each of the 8 1-horse carts 6000 =36 In each of the 16 2-horse carts =30 14,400 66		In the light Arty. park - - 81 In the reserve park 164 245	120 66 81 267	267 164 431
JAPAN ¶	1897 Arisaka (Meidji 30).	6.50	22.4	Mag. in rear of barrel, loaded with clip holding 5 cartridges.	8.5	120	120	2.9	Each company has one cart.	16,000	80	—	—	—

By way of comparison with the above, the following table shows the number of rounds to 3 kg. of the ammunition for the several rifles specified:

Paper Shells	Prussian smooth-bore infantry musket.....	85 rounds
	Prussian rifled infantry musket (new model)..	55 "
	Prussian needle gun M/41—69.....	78 "
	French chassepot rifle M/66.....	90 "
Metal Shells	Infantry rifle M/71.....	69 "
	Swiss rifle, M/67, 69/71, 81.....	98 "
	Rifle, M/98 with loading clips.....103	"

The cartridges are carried as follows by the soldier:

Germany: **45** rounds in each of the two cartridge boxes in front, and **60** in the knapsack;

Austria: **20** rounds in each of the two cartridge boxes in front, and **60** in the knapsack;

Russia: **30** rounds in each of the two cartridge boxes attached to the waist belt, in a breast cartridge box, and in a reserve cartridge box attached to the knapsack;

France: **120** rounds, in three cartridge boxes, two in front, and one behind;

England: In eight pockets attached to the waist belt, each holding **15** rounds (in addition each soldier carries a shoulder belt holding **50** rounds;

Japan: **30** rounds in each of the cartridge boxes in front, and **60** rounds in the cartridge box behind.

2. REGULATIONS GOVERNING THE SUPPLY OF AMMUNITION IN THE VARIOUS ARMIES.

GERMANY.

(Pars. 479—482 F.S.R.)

On the march, it is best to assemble all the company ammunition wagons of the battalions, as this renders supervision easier, and enables the battalion commander to regulate the replenishment of ammunition. Companies acting alone, as well as those forming the support of an advance guard, are followed by their ammunition wagons. It does not seem desirable to unite the ammunition wagons of a regiment or of a brigade on account of the distance separating the different battalions. During the march to the battlefield, the am-

munition should be taken out of the knapsacks, and the contents of the ammunition wagons distributed among the men. The men carry this extra ammunition in their haversacks and in their coat and trousers' pockets, etc.

The two-horse company ammunition wagon, Model 1897, has a width of track of 1.53 m., and, when empty, weighs 450 kg. Compared with the ammunition wagon Model C, 1887, which was originally designed to carry ammunition in boxes, it is lighter by 75 kg., and can be turned within a shorter radius. The wagon body is provided with double doors in front and in rear. The interior is divided into four compartments (to be emptied separately), each capable of holding 16 bundles of cartridges placed on end. Each bundle contains 15 packages of 15 cartridges in clips each. Each bundle of 225 cartridges weighs 7.25 kg.

As three bundles of cartridges are to be carried by one man, according to the Field Service Regulations (par. 480), 1 non-commissioned officer and 21 men are detailed to unload the ammunition wagon. The unloading is managed as follows: Four men take post on each side of the wagon, two handing out the bundles to the other two, who lay them on the ground. The remaining men place the bundles in piles of three in such a manner that the carrying loops of two in each pile can be interlaced and held together by a stick or a bayonet. An ammunition wagon can be emptied in this manner in four minutes. The two ammunition bundles tied together are slung over the left shoulder, the rifle is slung over the right shoulder, and the third bundle is carried in the right hand. In this way, a man can carry 21.8 kg.

Each man is issued 60 to 75 cartridges from the ammunition wagon. These weigh from 1.8 to 2.4 kg. When issued too soon, this additional burden causes considerable inconvenience, and consequently reduces the marching power of the men. The leader must also decide what shall be done with the ammunition in case it has been issued prematurely, and the troops fail to get into action. As soon as the ammunition wagons are emptied, they are sent to the rear in charge of the mounted wagonmaster, and refilled from the ammunition columns. When refilled, they rejoin their proper organizations. If requested, ammunition must be issued to any body of troops.

On the battlefield, ammunition wagons, unless they have been emptied, follow the movements of the several companies and take up a position under cover, indicated by the wagon-

master, as close as possible to the firing line—never more than 800 m. in rear of it. In urgent cases, this must be done without regard to losses. The firing line is supplied with ammunition, when practicable, by the reinforcements sent forward. When the firing line is about to run short of ammunition, this fact is communicated to the troops in rear by repeatedly making the signal "m". This signal, when made to the front by the troops in rear, signifies, "ammunition is coming up at once."

In exceptional cases, when ammunition must be sent to the firing line by individual men, the latter should invariably be detailed from troops in rear which have not as yet been engaged. These men must endeavor to reach the firing line by rushes or by crawling, and must then remain with that line.

It is the duty of the battalion commander to see that the ammunition taken from the ammunition wagons is promptly replaced. The higher commanders would do well to provide a reserve supply of ammunition, until the arrival of the ammunition columns, by assembling the ammunition wagons of the troops held in reserve. (Par. 482 F. S. R.). It will also be advisable to assign some of the ammunition wagons of the troops held in reserve to the organizations who will, in all probability, expend a large amount of ammunition.

The ammunition should be removed from the dead and wounded. If this is done by the men of an advancing skirmish line, there is danger that the forward movement will be retarded, and that some of the men will take advantage of this opportunity to make themselves "scarce." Officers and men should endeavor to replenish ammunition at every opportunity, without awaiting specific orders to that effect, and, in general, see that not only the prescribed number of rounds, but, on the contrary, as much ammunition as possible is on hand in the organization.

When the force is to stand on the defensive, especially if the position to be occupied has been prepared for defense, ammunition should be deposited all along the firing line. (Cartridge boxes or other utensils may be used as receptacles). It

is advisable to use first the cartridges carried in caps, haversacks, coat and trousers' pockets. The contents of the right cartridge box are saved for decisive moments when great rapidity of fire is essential. In replenishing ammunition, the right cartridge box is filled first, then the left, and the surplus is accommodated in haversack, coat and trousers' pockets.

AUSTRIA.

(Par. 70 Regulations of 1903).

The regulations are extremely thorough and deserve special attention. If an engagement is imminent, each private receives 20 additional rounds before leaving the bivouac or reserve position, and each non-commissioned officer 100 rounds from the company ammunition wagon, so that the latter is about half emptied.* This brings the total amount carried by each soldier up to 140 rounds, and increases the load of the privates by 0.71 kg., and that of the non-commissioned officers by about 4 kg. When troops go into action, the ammunition wagons are assembled and accompany the battalion reserve, taking as much advantage of cover as possible, so that the attention of the enemy may not be drawn to them. After the battalion reserve has been absorbed by the firing line, the ammunition wagons accompany the regimental reserve. When exposed to artillery fire, the wagons maintain intervals of twenty paces from one another. They are either placed under the orders of the battalion adjutant, or of the senior supply officer present with them, as may be directed by the battalion commander.

In attack, it will, as a rule, only be possible to replenish ammunition until troops get within about 1,000 paces (750 m.) of the enemy. From this point on, however, it will be extremely difficult to supply ammunition. Every lull in the fight must be taken advantage of to replenish ammunition. The firing line receives a fresh supply of ammunition through reinforcements or through small detachments under non-commissioned officers sent forward from the reserves. These detachments, after distributing the ammunition they have brought up, remain with the firing line. The companies engaged in the fire fight later take advantage of every opportunity to replenish and to redistribute ammunition.

In defense, all the ammunition wagons may be emptied before the action begins, and sent to the rear to be refilled. The ammunition should be deposited in the vicinity of the firing line. The subsequent replenishment of the supply should be managed as in an attack. If ammunition is very

*The company ammunition wagon carries 9,450 rounds of ammunition, packed in seven compartments. It consists of a body and a limber, has a width of track of 1.13 m., and is supplied with eight sacks which serve to carry ammunition to the troops. During the day its position is indicated by a red flag, and at night by a green lantern.

urgently needed by the firing line, and when no other remedy suggests itself, a part of the ammunition of the reserves may be turned over to the firing line. Special detachments should be detailed to remove the ammunition from the dead and wounded. Wounded men who are able to walk to the dressing station, turn over their ammunition to their comrades.

If another organization requests to be furnished ammunition, the entire amount required, or a part thereof, depending upon the urgency of the case and the amount available, should be turned over to it.

RUSSIA.*

The ammunition carried in the cartridge boxes of the men may prove insufficient during an action. On open ground the ammunition wagons, assembled by regiment, accompany the regimental reserve, and in covered terrain, they are assembled by battalion, and follow the battalion reserve. When practicable, their position is to be indicated during the day by red flags placed on their flank, and at night by green lanterns. In defense, an adequate supply of ammunition should be deposited in rear of the firing line, or should be at once distributed among the men. In attack, the ammunition supply of the firing line and of the supports is to be replenished when they enter ranges under 700 m. The best means of preventing shortage of ammunition is to husband it at long ranges. Ammunition wagons are not to be emptied and their contents distributed before an action begins; on the contrary, the ammunition is to be issued during the fight, one wagon after another being emptied. Ammunition may be sent forward from the reserve to the firing line, the men who carry it remaining with that line. On the other hand—and this seems to be the method most frequently employed—men from the firing line may be sent to the rear for ammunition. The men of the reserves at once turn over one-half of their cartridges to these men, who are then assembled and sent forward under the command of a non-commissioned officer. The ammunition is carried forward in sacks—so-called "bashlicks."

FRANCE.

Each company has one ammunition wagon, which is a part of the combat train (*train de combat*), and carries 16,384 Lebel cartridges, and 36 intrenching tools. It can carry 19,000 rounds of the new "D" ammunition.† So long as any ammunition remains in the ammunition wagons, they remain under all circumstances with their battalion. They are assembled in battalion groups on the left flank of their battalion. When the battalion

*In each battalion, the ammunition wagon of the 2nd company carries 108 explosive cartridges, weighing 200 g. each, and that of the 3rd company carries 48 fuses.

†The company ammunition wagon Model 1893 weighs 287 kg. when empty, and 770 kg. when filled. It carries 14,400 rounds of ammunition (net capacity 48%) or 66 rounds per rifle.

is broken up for advance, flank, rear guard, or outpost work, they remain with the main body of the battalion. When the companies are separated for a protracted period, the battalion commander decides whether or not the ammunition wagons should accompany their respective companies. The ammunition in the wagons is, as a general rule, to be distributed before the commencement of an action. If this is impossible when the force is taken by surprise, the commander of the group of ammunition wagons must bring them up as close as possible under cover, and the battalion commander must supervise the distribution of the ammunition. In quarters and on the march, the ammunition is to be replenished by taking the ammunition from the sick, from the men detailed away, or from the supply carried by the baggage wagon.* The ammunition in the baggage wagon is only to be used when all these other sources are exhausted. When an encounter with the enemy may be expected, and only a short march is anticipated, the ammunition carried in the baggage wagons may be distributed before starting.

Any further replenishment of ammunition is to be ordered by the division commander. The empty company ammunition wagons are assembled in regimental groups and follow at least 1,000 m. in rear of the regimental reserve. At each halt, the wagon train is to prepare for defense. The regimental commander is to regulate the distribution of the ammunition sent forward by the ammunition columns.

When this distribution cannot be made for some reason or other, the wagons, assembled in groups of four, follow their battalions. It is the duty of the battalion commander to keep the firing line supplied with ammunition. The contents of the company ammunition wagons are not to be replenished from the ammunition columns during an action. The ammunition is to be removed from the dead and wounded.

The source of the ammunition supply is the corps ammunition park, which is divided into three echelons, as follows:

Ist echelon consists of two infantry ammunition columns and marches at the head of the combat train of the troops engaged;

IInd echelon consists of three infantry ammunition columns;

IIIrd echelon carries artillery ammunition only.

Two infantry ammunition columns of the Ist echelon, which, as a rule, constitutes the "ammunition supply center" at the commencement of an action, march at the head of the combat train (*train de combat*). A half-filled infantry ammunition column must at all times be available at this "ammunition supply center." Ammunition wagons of the infantry ammunition column are sent forward at the request of the division commander to the position taken up by the company ammunition wagons. The latter are generally posted not more than 1,000 m. in the rear of the fighting line, and parts of each infantry ammunition column (usually one ammunition

*The baggage wagon weighs 450 kg. when empty, and 1054 kg. when loaded. It carries 36 intrenching tools, and a tool chest. Its net capacity is 45%. Forty knapsacks may be transported on this wagon in lieu of the ammunition.

wagon for each battalion) are posted by an officer not more than 1,500 m. in rear of these. The empty company ammunition wagons are not refilled, the ammunition being sent forward directly from the ammunition columns. As soon as the infantry ammunition columns are informed which organizations they are to supply, they send out non-commissioned officers to locate the ammunition wagons of those organizations and establish communication with them. The commander of the ammunition column directs where empty ammunition wagons are to assemble. In emergencies, wagons of the infantry ammunition column may also drive close up to the fighting line. In this case, empty wagons assemble near the groups of company ammunition wagons, and from there they are sent back in trains to the ammunition column to which they belong.

Every opportunity, such as a lull in the fight, or an abatement of the hostile fire, etc., must be utilized to distribute the ammunition of the company wagons or of the ammunition column.

It is prohibited to send wagons or men to the rear for the purpose of bringing up ammunition on the battlefield. All men sent forward with ammunition should remain in the firing line.

ENGLAND.

The British infantryman is usually provided with 115, and each machine gun with 3,500 rounds of ammunition. Each battalion is, in addition, provided with 8 pack animals, each carrying two ammunition chests containing 4,400 cartridges (77 kg.), and with 8 ammunition wagons.

On the march, the pack animals and half of the ammunition wagons follow immediately in rear of the battalion. The (16) remaining wagons form a reserve ammunition column at the disposal of the brigade commander, and march at the tail of the brigade. When an engagement is anticipated, 50 additional rounds (1.3 kg.) may be issued to each man before leaving camp. During an action, one pack animal and two ammunition wagons follow each half-battalion. Empty company ammunition wagons are refilled from the brigade reserve ammunition column. When the wagons of the latter are empty, they are replaced by filled wagons from the ammunition column. The teams are not transferred with the wagons, but remain with the organization to which they belong.

Ammunition wagons are expected to approach to within about 900 m. of the firing line, and pack animals to within 450 m. One non-commissioned officer and two or three privates are to be detailed from each company to bring up ammunition. Each man is to carry a sack containing 600 cartridges (16 kg.). That this method of supplying ammunition is practicable under fire is shown by the distinguished conduct lists for **Paardeberg**, where men were praised or decorated for endurance and fearlessness in bringing up ammunition. (See p. 371 supra). The men who bring up ammunition may be kept in the firing line when the ground is devoid of cover.

The division ammunition columns, although they carry both infantry and artillery ammunition, constitute an integral part of the artillery battalions.

ITALY.

When an encounter with the enemy is anticipated, the ammunition wagons are to be emptied, the men detailed to carry ammunition are to remove their packs, and each one of them is to carry ammunition weighing about 7.5 kg.

The packs are to be removed only in case of urgent necessity. When this is ordered, however, the soldier first removes all the cartridges and the emergency ration from his pack. The ammunition knapsacks, which are always to be taken along, are, however, carried in turn by all the soldiers of the company.

The advancing units that are in need of ammunition, may demand it from troops ordered to remain behind. They take along their own ammunition carriers. The latter, assembled in a squad, distribute the ammunition along the firing line, and remain with that line. In the first lull that occurs, they assemble again as a squad and take part as such in the action.

The empty ammunition knapsacks belonging to organizations in reserve are to be refilled as rapidly as possible from the ammunition wagons sent forward from the ammunition park to the fighting line.

The ammunition of the dead and wounded is to be removed and distributed among the remaining men. During pauses in the fire, the ammunition is to be equalized in all organizations engaged in the fire fight.

The ammunition wagons of the echelons in rear are to approach the fighting line as far as the available cover permits. Their position is to be indicated by flags. The ammunition carriers are to come to these wagons to refill the empty ammunition knapsacks.

3. WHAT DEDUCTIONS MAY BE MADE FROM THE REGULATIONS OF THE VARIOUS ARMIES.

1. The contents of the ammunition wagons should be distributed at the commencement of an action. This should not be done too early as the packing and unpacking of ammunition takes time, and as the soldier will not march so well when loaded down at the wrong time with 60 to 75 additional cartridges (1.8 to 2.4 kg.), unequally distributed in haversack and pockets. It is also a good plan to issue as many rounds of

ammunition to the non-commissioned officers as to the men. During a fight this ammunition can then be distributed to the men.

2. As soon as the ammunition wagons have been refilled from the ammunition columns, which have been brought up, they should at once endeavor to rejoin their battalions and should then follow as close as possible in rear of the latter. The expenditure of ammunition will never be equally distributed along the line; therefore, if the battalion commander retains all four ammunition wagons directly under his own orders, he will be better able to equalize the supply of ammunition than would be the case if each ammunition wagon, as soon as it is refilled, were to follow its own company, which, in many cases, it will scarcely find again.

3. It is the duty of the commander to assign a few ammunition wagons belonging to organizations held in reserve to bodies of troops which will in all probability need a greater quantity of ammunition.

4. The organization must be in possession of an adequate supply of ammunition on entering the zone of effective fire, i.e., at a distance of 600 m. from the enemy. The sending of individual men to the rear for the purpose of bringing up ammunition will only be practicable in rare cases. As a rule, the violence of the hostile fire will make this impossible. Only the best men can be sent back. It is asking too much to expect them to cross twice the zone swept by hostile fire. Moreover, the best men are needed in the firing line to encourage the weaker element, and to replace disabled squad leaders. Under no circumstances should the firing line be withdrawn to get ammunition from the ammunition wagons, as an attack made unexpectedly by the enemy might find the position unoccupied and thus cause its loss.* It is a general principle that ammunition must be sent forward from the rear.

*Examples: The loss of the park at Coulmiers (HELVIG, *Das I. bayerische Armeekorps*, p. 202. The engagement at Daix on January 21st, 1871 (*Geschichte des Regiments Nr. 61*, p. 174). KUNZ, *Loigny-Poupry*, p. 77.

5. The ammunition can be removed from the dead and wounded only in defense, or in attack when the forward movement has come to a standstill. In an advance, it cannot be done without retarding the movement and without affording individual men an excuse to remain behind.

6. The bringing up of ammunition by individual men, left to their own devises, is not to be recommended, as it facilitates "shirking"; moreover, if one of the men is disabled, the ammunition he carries will never reach the firing line. Ammunition should either be sent to the firing line with each support, or it should be carried by detachments sent forward in thin skirmish lines under the command of non-commissioned officers. These detachments should remain with the firing line.

7. Whether or not signals for informing the troops in rear of a shortage of ammunition in the firing line will fulfill the expectations entertained for them, can only be determined by the test of war.

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